MEASURING AND MAPPING THE IMPACT OF SOCIAL ECONOMY ENTERPRISES: A CASE OF CO-OPERATIVES IN CANADA

A Thesis

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ABSTRACT

The role of social economic enterprises (SEEs) in the health and prosperity of the communities they serve is gaining growing recognition. In Canada, SEEs such as co-operatives, community economic development organizations and other voluntary sector initiatives have been widely applauded for their role in addressing the impacts of globalization and economic restructuring experienced in remote rural and aboriginal communities as well as in marginalized urban populations.

This research reports on Canada-wide study consisting of a comprehensive mapping and measuring of the geographic spillovers of co-ops in and beyond their local communities. Communities are approximated by Consolidated Census Subdivisions (CCS) of which they are approximately over 2,600 in Canada (Statistics Canada, 1996). Data on the spatial attributes, type and size (per capita membership) of co-operatives are combined with a very extensive geographically coded data set containing socio-economic and amenity variables.

The percent change in population between 1991 and 2001 was regressed on these co-op and socio-economic variables. The regressions were estimated for rural and urban CCS separately. In general, most of the results from the rural and urban samples complied with theoretical predictions, that is, communities with favorable socio-economic factors were found to have higher population growth. For instance, factors such as high local employment rates, and entrepreneurship (measured by the share of population engaging in non farm self employment) were important factors influencing population growth. Proximity to larger urban centers and population size appeared to be beneficial for communities, especially rural, indicating the importance of strong rural-urban linkages. However, the presence of agriculture and resource extraction sectors tended to result in lower population growth. The share of population of

aboriginal origin, an important demographic variable, was also a positive contributor to population change.

Finally, in the presence of the prevailing socio-economic and spatial attributes of the communities, at the national level, we found no empirical evidence that co-operative membership influenced population growth. There is, however, some variation in the results when we reduced our geography level to regions, and our analyses to different co-op types/industries. There is some evidence that co-op activity in some regions such as rural CCSs in British Columbia and urban CCSs in Quebec have a positive impact on population growth. Similar results were also obtained for housing and consumer co-ops in rural communities, as well as retail, and 'other' service co-ops in urban communities.

The results suggest that there may be scope for co-ops to examine ways of enhancing their social capital role in their communities, specifically developing mechanisms that respond to evolving community needs. Future research may also focus on additional ways of measuring the impact of co-ops in their communities. Most importantly, a very important part of the co-operative sector, the financial co-ops, should be part of a broader consideration of the influence of co-operatives on community population change.

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I greatly acknowledge the encouragement and guidance from my supervisor, Professor Rose.M Olfert. This work was a learning curve for me, when I look back I am in aware of your supervision and I have gained so much during the times we worked together. I also acknowledge Professor Mark Partridge for his insights and guidance as co-supervisor. Appreciation is extended to Brett Fairbairn and Murray Fulton for sharing their time and timely feedback on my work as committee members. Thanks also go to Cristina Echevarria for serving as my external examiner.

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To my parents, to whom I dedicate this work, words alone cannot say what I feel and want to say to you, serve to say you are aware some and you are the best. Finally to GOD, with whom all things are possible; this excerpt holds true for me, my siblings and friends.

"Our deepest fear is not that we are inadequate. Our deepest fear is that we are powerful beyond measure. It is our light, not our darkness that most frightens us. We ask ourselves, Who am I to be brilliant, gorgeous, talented, and fabulous? Actually, who are you **not** *to be? You are a child of God. Your playing small does not serve the world. There is nothing enlightened about shrinking so that other people won't feel insecure around you. We are all meant to shine, as children do. We were born to make manifest the glory of God that is within us. It's not just in some of us; it's in everyone. And as we let our own light shine, we unconsciously give other people permission to do the same. As we are liberated from our own fear, our presence automatically liberates others."*

~ Marianne Williamson ~

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CHAPTER 1: INTRODUCTION

1.0 Introduction

Globalization and socio-economic restructuring have over the years given rise to quality of life disparities across communities in Canada, resulting in households moving to more amenable places, or in other words leading to some communities gaining (losing) population more than others. In general, rural and small town areas in Canada are experiencing a decline in population, especially those dependent on primary sectors (Bollman and Mendelson, 1998; Agriculture and Agri-Food Canada, 2002; Nagy et al., 2004). For instance, the share of population living in rural and small town areas has declined from 34 percent in 1976 to 22 percent in 1996 (Bollman and Mendelson, 1998). Population retention and growth is a concern for cities, towns and rural municipalities across Canada, and population change is one of the best available indicators of economic prosperity (Ferguson et al., 2007).

The changing spatial distribution of the population is a reflection of people "voting with their feet" and choosing urban over rural locations. The long term decline of rural communities is, however, not universal, some rural areas fare relatively well. It is thus important to understand the basis of rural community growth and vitality based on accepted theoretical foundations and empirical studies. Partridge et al. (2006a) indicated that the dynamics of these population changes are key issues for policymakers whose role is to predict and manage these flows, particularly in the case of population outflows or stagnation.

In seeking to understand what makes some communities relatively more attractive, a strong interest in how much the social economy can offer has captured the attention of governments, policy makers and researchers from across many disciplines. Along with economic factors that drive population growth, there is growing interest in whether the social economy also plays a role. Social economy enterprises, referred to as SEEs hereafter, are businesses

comprising co-operatives, credit unions, mutual insurers, not-for profit corporations and unincorporated associations that are democratically governed by their members or stakeholders to produce and deliver goods and services in the market place (PRI, 2005; Quarter, 1992). SEEs have also been portrayed as deliverers of public services, arising due to the decay of systems that cater to the basic needs of communities. SEEs are different from other forms of businesses in that they redirect their surpluses in the pursuit of social and community goals and that the central issue is citizen engagement. SEEs in other words combine a social dimension with an economic one (Levesque et al., 2004).

In general, SEEs are purported to have the ability to address multiple objectives – social, economic, environmental and cultural. For instance the social economy builds on and produces social capital, social cohesion and relational assets (OECD, 2003; Gui, 2001). As Putnam (1993) describes, social capital generates social networks, trust and a sense of belonging which enhance the quality of life within communities. This would make communities with higher social capital more desirable locations for both existing residents and potential migrants. Social capital can also reduce transaction costs and thus increase economic efficiency and productivity in a community. To the extent that co-ops contribute to the social capital in a community they may be instrumental in improving the desirability of the community as a location for both households and businesses, thus contributing to community population growth, and /or mitigating decline.

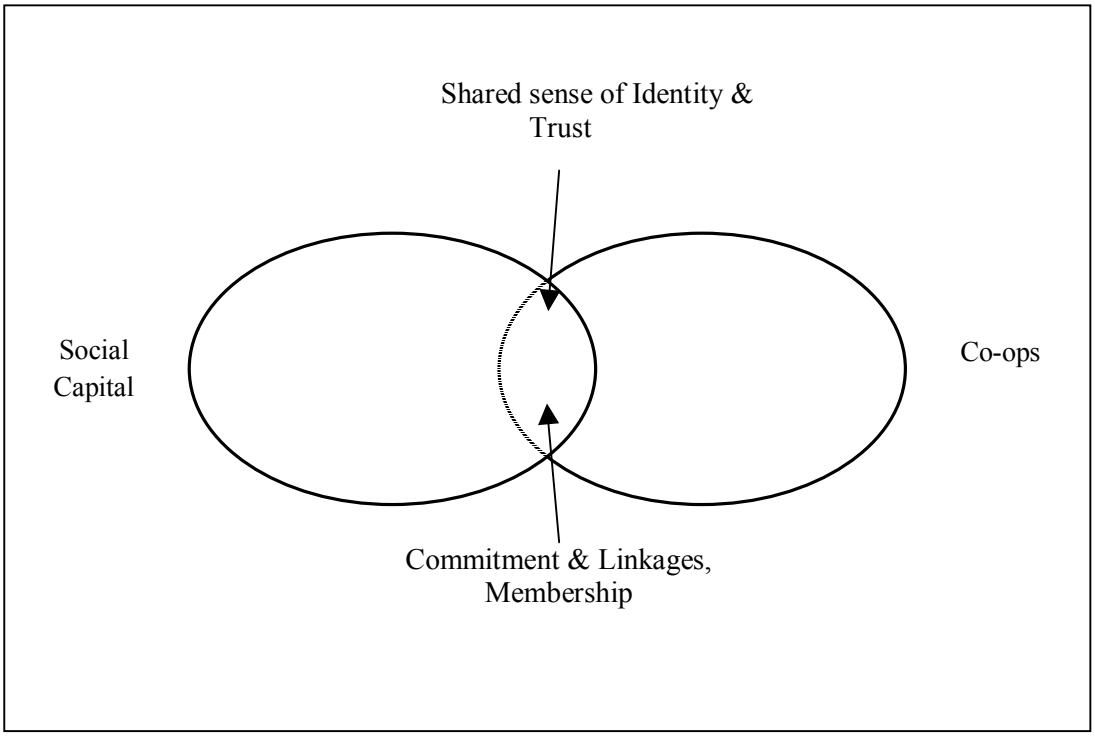
The ties and norms that constitute social capital are often created as by-products of other social activities and then transferred from one setting to the other. However in the absence of appropriate reinforcements, social capital can be inherently nontransferable. SEEs such as co-operatives are such reinforcements. They help create and retain social capital within communities through giving groups the capacity to form networks to produce goods and

services, and at the same time they build on the existing social capital levels within communities. In this regard we consider co-operatives as a well established form of social economy enterprises in Canada. For instance through allowing people to come to work together towards a common goal, co-ops help promote trust, inclusion and equity among citizens (Co-operative Secretariat, 2005). Thus, co-ops may be seen as an indication of the presence of social capital, and vehicles that augment the development of networks that anchor a community's social capital.

As ascertained by Carr (1996), social capital cannot be created instantly, takes time to develop and if not used can be eroded. However, in using this premise, caution has to be exercised. Although there are volumes of literature on the concept of social capital, there is neither a universal measurement method nor a single underlying indicator commonly accepted by the literature (Glaeser et al., 2000). As illustrated by the diagram below, the intersection of the Venn diagram indicates the cross cutting linkages between the concept of social capital and co-operative activity, such as the networks, trusts and the cohesion that is enhanced by using co-ops or belonging to a co-op (membership).

While co-operative activity (membership in co-ops) can contribute to social capital, there are aspects of social capital that extend well beyond co-operative activity. Similarly, the influence of co-ops will extend well beyond those aspects that relate to social capital. For example, co-ops may serve as a source of employment for their members or even the community at large, an activity that should not be construed as social capital, and as such may limit how our results can be interpreted. Co-ops may influence population growth through avenues other than social capital. Social capital is generally expected to influence population growth. In the intersecting part of Figure 1.1 these influences combine and the net effect on population growth will be the result of these two factors.

Figure 1.1: Linkages between Social Capital and Co-op Activity



Although the social economy has been developing over years, the growth in focus has been initiated by the need for governments to look for alternative service delivery mechanisms where general public service no longer has the capacity to continue efficiently (Restakis and Lindquist, 2001). Recently, in 2004, the government of Canada committed an amount of $132 million in support for the social economy through capacity building, provision of finance for those enterprises that need federal financial support and lastly by enhancing more research on the social economy. The social economy has become a key part of Canada's social policy tool kit.[1] In light of these developments, an in-depth understanding of the role of co-operatives (as our example of SEEs) in community growth and vitality is thus of practical as well as academic interest. Our major interest in undertaking this research is to investigate whether co-operatives,

[1] Adapted from Human Resources and Social Development Canada at http://www.hrsdc.gc.ca/cgi-bin/hrsdc-rhdsc/print/print.asp?Page_Url=/en/cs/comm/sd/social_economy.shtml

as examples of SEEs can be observed to have an influence, possibly through building social capital, on the desirability of a community in terms of the location decisions of households and firms as portrayed by population growth. The population that a particular community can attract or sustain has strong implications for the survival and future of the community.

1.1 Research Objectives

Guided by the overview presented of recent literature, the intention of this research is to discern the impact of SEEs on community welfare as indicated by population change. Using co-operatives as representative of SEEs, operating through their contribution to social capital, the overall objective of this study is to provide an in-depth assessment of the impact of the presence of co-operatives on community growth and viability in Canada and to provide empirical evidence of their geographic spillovers beyond their local communities. Consistent with this perspective the specific objectives would be:

a) To evaluate the impact of co-operatives on population change in the communities in which they are situated;
b) To provide an understanding of how the impact of co-operatives varies spatially;
c) To assess how the different types of co-operatives impact population growth in local communities; and
d) To provide a visual depiction of the incidence and impact of co-operatives.

1.2 Research Hypothesis

To achieve our objectives this study will be guided by the following hypotheses:

a) Communities with a higher level of co-op activity (potentially contributing to social capital) grow faster than those with lower levels; and
b) Various co-op types may have different effects on their communities.

Hypothesis a) above may also be expressed as follows. The null hypothesis would be:

H_0= Co-op activity has no effect on community population growth.

To reject the null hypothesis it is necessary that some impact is found.

1.3 Expected Contribution and Justification of Study

Population change, how people locate to various locations, is one of the well known measures of the economic success of a community. To date many studies from different disciplines have provided researchers, policy analysts and, governments and community development partners with studies that have investigated the determinants of population growth. In the U.S. and Canada these studies have investigated a variety of factors including economic, amenity, social capital and other non-economic factors. For instance, the literature has elaborated on how social capital leads to healthy communities, that is, how the relationships built by people in communities makes certain communities safe place to live as well as provide " a sense of belonging" (Flora, 1993). Putnam (1993) investigated the importance of social capital in the growth of regions and showed the resulting differences in growth of Northern and Southern regions of Italy.

In other scenarios there are also studies elaborating on the importance of economic factors such as the probability of finding employment upon relocating, on the location decisions of households (Partridge et al., 2007). Further, these studies have also shown that attributes such as availability of up scale shopping centers and places of recreation are drivers of population growth. On the other hand there is a growing literature addressing the importance of co-operatives in the health and vitality of communities in which they are situated (Fairbairn et al., 1991; Simbandumwe et al., 1991; Gittel and Vidal, 1998). However, regardless of the volumes

of literature on the above elaborated factors, an empirical analysis of the role of co-operatives in economic success as portrayed by population growth is generally lacking.

This research is thus contributing to the literature by providing an empirical analysis of the impact of co-ops on population change. An empirical analysis of this nature is unique in that we combine a set of already known population growth attributes with data on the presence and type of co-ops to investigate the marginal influence of co-ops on population growth. In addition, this research will provide a visual representation of the incidence (intensity) and distribution of co-ops across Canada to enhance our understanding of where co-ops are present. The visual representation is another way to enrich our understanding of the spatial distribution of co-ops.

1.4 Background

This section provides an overview of the origins of co-operatives followed by an overview of how the movement emerged in Canada. We present this section to explain the past and present scenario in the co-operatives sector in order to gain a better understanding of how this sector may enhance the growth of communities especially those rural communities that are in decline. In addition to this, selected descriptive statistics will also be used as evidence of the presence and incidence of co-operatives in the Canadian economy.

1.4.1 A History of the Co-operatives Movement

The co-operatives movement dates back to the early decades of the 19th century when urban workers and small farmers in Great Britain and Continental Europe reacted to the economic and social problem brought about by industrialization and urbanization (MacPherson, 1979). For instance, households in Britain were frustrated by the adulteration of food products, payment of meager salaries and a general fall of living standards. For ordinary citizens, industrialization meant little control over their living conditions, whilst the rich became richer

and richer at the expense of the poor and middle class citizens (Birchall, 1997). A common name in the history of the emergence of co-ops was Robert Owen[2], an industrialist who saw co-operatives as the solution to many socio-economic ills that were suffered by poor working people. As the idea of co-operatives grew, many urban workers turned to co-operative enterprises for support. This gave rise to a series of consumer co-operative movements between 1840 and 1900 (McPherson, 1979; Fairbairn, 1989).

While the British co-operative movement grew and was mainly concerned with urban consumers and workers, another form of co-operatives addressing the plight of small farmers emerged in Germany. For the small poor farmers, industrialization came with the development of large farms that undermined the traditional agriculture. It also meant that the communities that survived on providing labour on farms were left without a source of livelihood (Saxena, 1993). These agricultural co-operatives were pioneered by Friedrich Raiffessen from Germany. With use of agricultural co-operatives farmers aimed at gaining control over marketing of their products, purchase of farm inputs as well as the provision of credit for agricultural purposes.

Yet other forms of co-operation – worker co-ops in France and Italy and credit co-operatives in Germany developed preceding the consumer co-ops in Britain. Invention of credit co-operatives came to be known as one of the most distinctive form of co-operativism. However, unlike other co-ops forms, worker co-ops were not strongly asserted in other parts of the world until well into the 20th century. The major reason was that worker co-ops were hard to promote and maintain (Birchall, 1997).

Amongst the first co-operators, the most prominent were the Rochdale Pioneers in Britain. The Rochdale Pioneers were a small group of men - some of them weavers- self educated workers who got together to form a co-operative society. While these co-ops were

[2] Robert Owen was known as the 'Father of Co-operation' and of British socialism.

formed by 'workers' they were really consumer co-ops and not 'worker co-ops as they may be thought of today, that is, where the employees are the owners of the co-operative. The Rochdale co-ops grew in importance throughout the 19th century and are considered the origin of the modern co-operative in today's world largely because they were the first to make their co-op succeed and endure. David Thompson (1994), in Weaver of Dreams states it best:

> *"The Rochdale Pioneers were ordinary people who created an extraordinary concept….while others bombed, they built, while others suppressed hope, they sought harmony. They knew that through co-operation they held the key to the future. A simple idea, a committed group. They began a revolution that brought hope to millions and harm to none. The Pioneers gave birth to the idea of modern co-operation and the world is a better place because of it."*

Unlike the earlier co-op societies, the Rochdale Pioneers operated on a set of principles, and these were formally set out in 1844. These principles formed the basis for what are now known as the cooperative principles-guidelines by which co-operatives put their values into practice worldwide (McPherson, 1979; Thompson, 1994 and Saxena, 1993). As laid down in 1844, the Rochdale principles may be summarised in Table 1.1.

The original Rochdale Principles were officially adopted by the International Co-operative Alliance (ICA) in 1937 and over the years have undergone reformulation first in 1966 and recently in 1995. After 1860 the British movement grew rapidly and by 1900 was the most powerful co-operative movement. As co-ops continued to grow into many forms, the model that was set by the Rochdale seems to be acknowledged to be the norm. Each form emerged mainly within one country and whenever the environment was conducive, spread rapidly throughout Europe and has since spread into farming, dairying, and housing, education, wholesaling, and banking initiatives worldwide. Co-ops are still relevant in today's world because they are able to meet the ever evolving needs of their members (Birchall, 1997). Since their inception co-

operatives have always had unique characteristic. As outlined in Table 1.2 co-operatives differ from other businesses in three key ways.

Table 1.1: Rochdale Co-operative Principles, 1844

Open membership- as voluntary organisations, co-operatives are open to all people from all walks of life
Democratic control- co-op members democratically control the day to day running of their organisation through an active participation in strategic planning, management and policy making. Members of primary co-ops have equal voting rights, that is, one man one vote
Distribution of surplus as dividend on purchase- all returns to investments belong to the members and should be distributed in accordance to members agreements e.g. members may receive dividends in proportion to their transactions with the society
Payment of limited interest on capital- share capital should only receive a strictly limited rate of interest.
Political and religious neutrality- co-op societies should be able to represent the socio-economic needs of the community without identification with any particular political group or party.
Cash trading – commitment to offer goods and services on a cash upfront basis (no credit extended).
Provision of pure and unadulterated goods -a commitment to providing only high quality goods and services
Promotion of education- this principle meant to provide education and training for their members (to enable informed decision making and effective co-op development) and the general public at large about the nature and benefits of co-operation.

Adapted from Birchall, 1997

1.4.2 The Emergence of Co-operatives in Canada

The co-operative movement found its way into Canada around the 1860s, twenty years after the movement in Great Britain. In Canada, as in Europe, co-ops were started as a way to protect the interest of the less powerful in their societies. McPherson (1979) states it well when he says that "it was the well-to-do and the intellectuals" who developed co-operative societies to help the poor and the ignorant escape from the socio-economic ills which industrialization and urbanisation brought upon them. In this study our "co-operatives", in some instances shortened to co-ops do not include credit co-operatives (credit unions) due to data limitations. However, a

brief history of these credit unions is incorporated in our co-operative historical overview study to provide a complete understanding of the history of all forms of co-operatives.

Table 1.2: How do co-ops differ from other businesses?

A Different Purpose: The primary purpose of co-operatives is to meet the common needs of their members, whereas the primary purpose of most investor-owned businesses is to maximize profit for shareholders. **A Different Control Structure**: Co-operatives use the one-member/one-vote system, not the one-vote-per-share system used by most businesses. This helps the co-operatives serve the common need rather than the individual need, and is a way to ensure that people, not capital, control the organization. **A Different Allocation of Profit**: Co-operatives share profits among their member-owners on the basis of how much they use the co-op, not on how many shares they hold. Co-operatives also tend to invest their profits in improving service to members and promoting the well-being of their communities.

Adapted from: The Canadian Co-operative Association, 2007

As the first forms of co-operativism spread in various region of the world, these also found their way into Canada. The roots of consumer co-ops were found in mutual insurance organisations formed by farmers and co-operative stores in mining communities across the country between the 1860s and 1880s. The first era of these user co-operatives are documented to have started in Stellarton, Nova Scotia, in 1861 (Quarter, 1992; Birchall, 1997). Later on a series of other smaller consumer co-ops spread to other mining districts in British Columbia, Alberta and to the big cities of Halifax, Montreal, Winnipeg and Toronto (McPherson, 1979 and Fairbairn, 2004). As McPherson (1979) elaborates the survival of these early consumer co-ops was hindered by the fact that conditions before 1900 were not congenial for proper development of sustainable co-ops. For instance, there was generally lack of understanding of how co-operative societies work. Lack of capital and poor management also hindered the proper development of these co-ops. Additionally, the occurrence of World War one also destroyed the structures upon which the co-ops were built and were not able to re-establish themselves there after. The early emergence of agricultural co-ops was influenced by some American co-

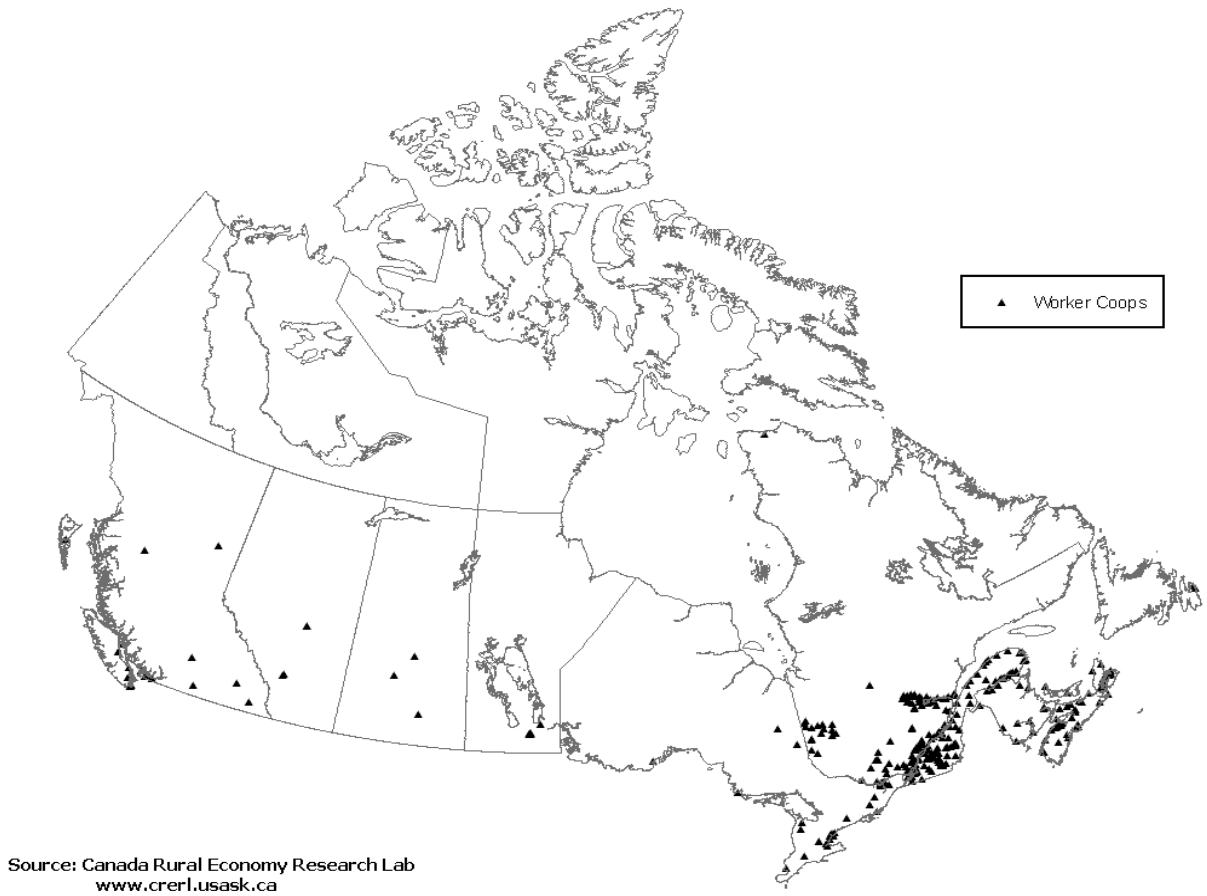
operators who assisted farmers in Ontario to set up cheese factories. By the end of the century better progress was found in the co-operatives that produced and marketed milk products in Ontario and Quebec and later extended to marketing co-ops for eggs and poultry and a system of mutual insurance among farmers. However, like any other early co-ops these did not endure (Birchall, 1997).

It was not until later years in the 1900 that co-ops, particularly in English Canada, gained momentum. Among the various societal ills befalling Canadians, the farming community was particularly affected. For farmers, there was a need to gain control over buying and marketing of their inputs and products respectively. The farmers sensed a very harmful intolerance of power. They were at the mercy of very large companies, some with monopoly power, both for the marketing of their products and the supply of their inputs. The greatest progress was made in Prairie grain marketing, through the emergence of grain growers associations[3] in 1906. As Fairbairn (1989) ascertains, by the turn of the 20th century this group overshadowed the early revolutionary movement by urban workers in terms of development of co-operatives. On the other hand, the equivalent of German credit co-operatives also emerged in Canada to address problems of lack of credit support that urban working class citizens were facing. Alphonse Desjardins started the first credit co-operative[4] in 1900 at Levis, in Quebec City and later these co-ops spread to other parts of Canada. Most credit unions, especially in western Canada, were created after 1944 (Craig, 1993; MacPherson, 1979; Fairbairn, 1989). Another form of co-ops that emerged in Europe was the worker co-op, where they were really consumer co-ops formed by 'workers'. Worker co-ops introduced in the Canadian economy as the co-op movement spread

[3] The Grain Growers Company was the biggest of these grains growing association, which later became known as United Grain Growers and in 1913 to the Saskatchewan Co-operatives Elevator Company (Sask Co-op).
[4] Note that we discuss the history of the credit co-operatives (financial co-op) in this section of the research to provide a clear understanding of how co-operatives in Canada are put into the context of the worldwide movement. In other discussions our focus is made with reference only to non financial co-operatives.

worldwide, were fundamentally different in that the employees owned the co-operative. These Canadian worker co-ops never became an integral part of the Canadian working class to the extent that the consumer co-ops formed by workers did in Britain. According to Fairbairn (1990), the major disincentive was the sparse concentration of urban workers as well as the heterogeneity in the working class structures that did not give the working class of those days the need to turn to co-ops for help. The result was that there was nothing to enhance the potential of the worker co-ops to become a major political force**.** Even in present day Canada, worker co-ops are much less prominent than any other co-op types, whether in business scale or membership. Most worker co-ops are located in Quebec in the forestry and ambulance service industries, with another significant cluster in Atlantic Canada as illustrated in figure 1.2.

Figure 1.2: Distribution of Worker Co-ops in Canada, 2005



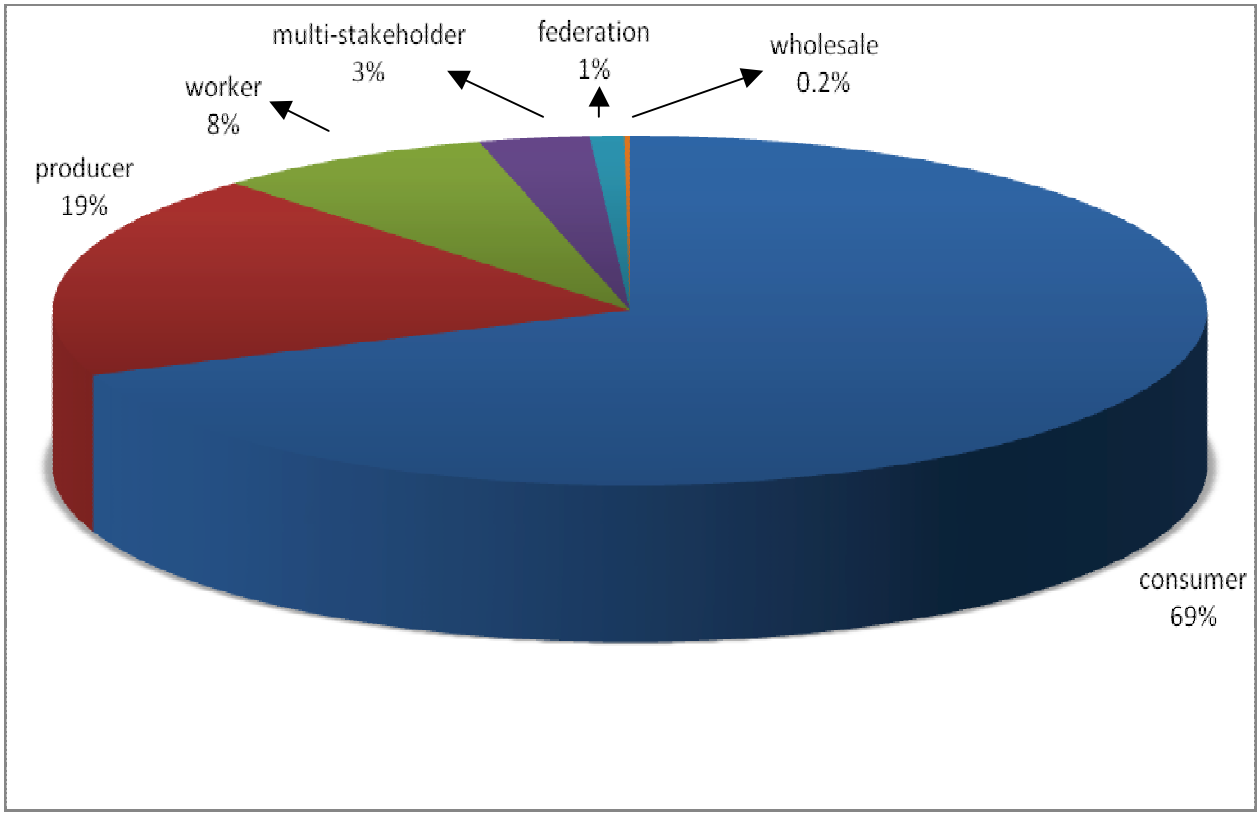
In total, worker co-operatives in Canada constitute eight percent of all the operational co-ops, and figure 1.2 illustrates their sparse distribution across regions in Canada (Co-operative Secretariat, 2005 data). From the above major co-ops that developed in Canada until the turn of the 20th century, other co-ops extensions have since emerged in accordance with the needs and availability of local support structures. The most well known is the co-operative retailing system of Western Canada. The roots of this extensive retailing system can be tracked to the initiatives of rural community-based kinds of co-operatives. For instance, agricultural producers in Saskatchewan and other pre-existing consumer co-ops, who joined to form buying clubs in order to make bulk purchases of farm supplies and basic commodities (Simbandumwe et al., 1991; Fairbairn, 1989 and Fairbairn, 2005). As this form of co-ops grew, by the 1920s some retail co-operatives amalgamated to form their own wholesale societies that later consolidated to form what has come to be widely known today as federated co-ops. Federated co-ops grew as the central wholesaler, merchandiser and manufacturing service provider for their local co-operatives (Fulton, 1988). Although the retail co-operatives in the federated system tend to be situated in small communities, the largest ones are in such urban centres as Calgary, Saskatoon and Regina (Quarter, 1992).

Housing co-ops are another well known form of co-operative development. They can be traced to the early 1970s and are documented to have risen from a growing problem of affordability of housing particularly in the fast-growing cities of Toronto and Vancouver. Their survival was largely due to an amendment to the Housing Act[5] in 1973 that enabled non-profit corporations, including co-ops to access loans to start house building projects. These funding opportunities, however, ceased in 1996. Other common user co-ops are health and social care co-

[5] The Housing Act had been first passed in 1938 entailing federal support to low interest mortgage for purchasing houses. Due to some political opposition, this facility was ceased and was later revisited in the 1970s when the problem of affordable houses grew.

ops such as day care and community co-ops and these are most prominent in Quebec (Birchall, 1997). There is however a regional bias in co-op development. For instance, Quebec has the fastest growing worker, housing and consumer co-ops. This may be attributed to the level of government support and the presence of regional federations for each sector as well as outstanding credit union sector (Birchall, 1997). There is also the province of Saskatchewan which has developed one of the most powerful co-operative sectors. This is attributed to the degree of government support extended to co-operatives in terms of leadership, advice and legislation (Quarter, 1992 and Fairbairn, 2001). Yet in some cases such as the Canadian North, the first co-ops were legally incorporated in 1960 (Ketilson, 1990; McCarville, 2004). In general, Canada with close to 7,000 co-operatives and a total membership of over 21million has the most co-operative economy in the Americas.

Figure 1.3: Co-operatives in Canada, by Co-op Type



Source: Co-operatives Secretariat, 2005

However in terms of numbers, the United States has the highest number of co-ops in North America with over 47,000 co-ops and around 100 million members by 2005 (Co-operative Secretariat Co-op data, 2005; Statistic Canada, 2001; CRERL, 2006 and Birchall, 1997). Today there is a variety of co-op types in the Canadian economy. Figure 1.3 above illustrates that the consumer co-ops are the largest, followed by producer co-ops. Our division of co-ops into co-op type is adapted from the Co-operatives Secretariat, from which the data was sourced. Refer to section 5.2.3 for further discussions on what each type mean and represent.

1.5 Organization of Thesis

This study is organized into six chapters. The first chapter has given the background and defined the problem under investigation. Chapter 2 provides a literature review of the determinants of population growth and vitality, as well as exploring what past studies have found on the role of co-operatives on community growth. Chapter 3 discusses the theoretical foundation of our study which will mainly focus on the utility maximisation and cost minimisation behaviours of households and firms respectively. This framework will provide an understanding of the location decision choices by both firms and households. Chapter 4 covers the methodology utilized in this study as well as a summary of the data used and its sources. The results of the regression analysis and various sensitivity analyses that are incorporated in the study are discussed in Chapter 5. We conclude this study by summarizing the research findings, outlining the limitations and discussing areas of further study in Chapter 6.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This section presents a selected review of the theoretical and empirical literature related to the current study. Using past research from the United States and Canada, and where applicable other regions in the world, we first explore key concepts related to determinants of rural community growth. The next section will provide an overview of studies on the role of social capital in community development. As our area of main focus we also review literature on the amenity and social capital attributes of co-operatives. A summary of insights from our literature reviews concludes this chapter.

2.1 Determinants of Community Population Growth

In this research we measure community growth by the percentage change in population over time. While population change is comprised of both natural and net migration, we focus on the latter as net migration illustrates people "voting with their feet" to favored localities. It is thus important to provide a review of some of the factors that have been argued to influence the growth of communities. According to Bollman and Mendelson (1998), migration dynamics are a key component in understanding rural development. Migration especially concerns rural and small areas as rural development is essentially a demographic phenomenon. They contend that rural development discussions generate questions on how many people live within a specific area, and whether the densities are sufficient to be drivers of economic growth. The Central Place Theory supports this argument through one of its concepts of the demand threshold. The demand threshold is defined as the minimum market size, often approximated by population size, for normal profit that firms consider in starting up or remaining in a particular business (Stabler et al., 1992).

We know that regardless of the presence of natural amenities such as mountains, lakes, or open space and lack of congestion among others, rural areas often lose populations to urban areas (Bollman, 2006). Urban areas are attractive due to the presence of infrastructure such as upscale shopping, diverse cultural values, sports, and shopping and recreation centers. As there are multiple influences, it is important for both academic and policy purposes to understand the relative contribution of factors driving location decisions of people.

Blomquist et al. (1988) showed that along with job availability, location decisions have also been influenced by the quality of life of an area. The quality of life rankings were based on amenity levels such as climatic, neighborhood safety, geography, education and environmental variables within a given locality. Thus quality of life stimuli are important factors in influencing households to relocate to areas that offer gains in net utility.

In a similar study, Partridge et al. (2007) examined whether the largest Canadian urban centers-defined as a metropolitan are whose population is greater than 500,000- enhance the growth of surrounding areas or whether the population growth is more responsive in response to amenity related factors (as with the case of U.S migration patterns). Their findings indicated proximity to a large urban centre enhances growth of neighboring areas. In general the study pointed out that a combination of economic and non-economic attributes drive population change. Hence successful economic development is a combination of job creation, incomes, economic stability and quality of life (Partridge, 2007). Similar studies, e.g. Ferguson et al. (2007) found rural area population change to be more influenced by economic factors than amenities. However, in urban areas, amenities were found to have equal importance with economic factors.

Under the assumption that the interregional system is in equilibrium, Roback (1982) constructed a theoretical framework to determine the role of wages (earnings) and rents in the location decisions made by households and firms. In her model, she computed land rents and weekly wages against site specific attributes (amenities) and personal characteristics to determine the extent of spatial differences in earnings attributable to amenities. She did a unique computation by considering the effects of amenities on both wages and rents, considering that most researchers have pointed out that only land prices are affected by local amenities. Although her empirical results were sufficient to lead her to the conclusion that the regional differences in earnings can be largely accounted for by the regional differences in amenities, one of her key insights was that it is not always the case that amenities play a role in explaining earning differentials. For instance, when comparing the North-Eastern and South-Eastern versus the Midwestern states of the U.S. she found no significant differences in earnings between these areas. This might point out other forces at play in determining wages other than local amenities.

However, some researchers have challenged some of these conclusions, stating that using the assumption of an equilibrium system in the interregional markets to compute proxies for differences in environment quality across locations may understate these measures. Greenwood et al. (1991) instead pointed out that some states are not in equilibrium during specific research time frames. Thus they computed a model that assumed both equilibrium and disequilibrium components of the system and found some statistical differences in the classification of regions according to the key determinants of population growth, compared with Roback.

Subsequent researchers have extended the model into an examination of the role of amenities in population growth akin to Roback's recognition that much of the variation in wages across regions represents compensation for amenities. For instance, Carlino and Mills (1987)

used a simultaneous equations framework to explore the determinants of population and employment growth in various regions of the United States. They made use of predetermined explanatory (economic, demographic, climatic) variables to mitigate simultaneity and direction of causation issues. The study found that for employment growth, interregional differences in social-economic conditions matter, yet after controlling for these variations in the population and total employment regression estimates, climate was found to be a major growth determining factor, that is, the presence of the Sunbelt exerted a profound impact on U.S. county population and total employment growth.

In essence, communities with favorable amenities and economic factors are expected to have higher population growth due to inter-regional migration decisions. Migration for weather related reasons is due to individuals having increased their valuation of the weather's contribution to their quality of life coupled with rising incomes (Glaeser, Kolko and Saiz, 2001). Some researchers argue that quality of life or the "sense of belonging" in a community enables residents to remain in particular areas (all things constant), as well as participate in community development (Flora, 1998). Along the same lines, Partridge and Rickman (2003) contended that it is utility derived from a combination of region-specific attributes such as incomes and amenities that offers the best yardstick of progress in the economic development of a region.

2.2 Social Capital

2.2.1 Defining social capital

Although Hanifan's (1916) work could be interpreted as pioneering the term 'social capital', the modern usage of the term can be traced in the 1960s through the work on the value of networks by Jane Jacobs (1961). However, she did not provide a concrete definition for the term social capital. The first cohesive exposition of the term was by Pierre Bourdieu in 1972. Over the last decade, the seminal works of James Coleman (1990) and Robert Putnam (1993) on

social capital have invoked a variety of research across almost all social science disciplines. Broadly understood as referring to the relations that affect interactions, the concept of social capital has been used to explain an immense range of phenomena, from political participation to institutional performance, health, corruption, the efficiency of public service delivery, and the economic success of countries. However, in spite of the broad usage of the term, there is no consensus in what the operational definition should be.

Coleman (1990) defines social capital as organizations, structures and social relations that are built by people themselves, independently of the state or corporate sector. It encompasses relationships and is manifested in the structure of interactions between and among persons. Other researchers chose to further classify organizational features to define social capital. For instance, Putnam (1993) defines social capital as features of organizations, such as trust, norms and networks that can improve a society's efficiency. Although both researchers emphasize the benefits of social capital in groups, Putnam's definition tends to touch more on the forms of social capital and how they influence societies. For example, the ability to engage in community development, sustainable or otherwise, depends in large part upon the existence of social relationships or networks that enable community organization, problem solving and decision making (Flora 1998) and it depends on individual and institutional leadership, community building and resource mobilization skills (Gittel and Vidal 1998).

Altogether, these capacities are found in a community's social capital. Although a working definition difference arises among users of the term-social capital, there is a broad agreement that trust, norms of reciprocity and social sanctions are at the core of the concept. Additionally, the above definitions treat social capital as a community characteristic and most modern literature has adopted it in that way.

Some critiques have emerged in recent years outlining the deficiency of such terms in empirical work. Durluf and Fafchamps (2004) present the most elaborate of such critiques. They indicated that for the sake of empirical estimations, social capital must be defined in terms of measurable variables. Their research emphasized that the use of defining features such as 'norms and trust' makes measurement difficult because these terms are broad and are hard to define in terms of a specific time frame. Regardless of the flaws that might be found in the use of social capital, numerous reports have documented the role that social capital plays in community growth which the next section is going to discuss.

2.2.2 Role of social capital in Community growth

Although the concept of social capital has been wide spread in discussion across disciplines, it has emerged with greater frequency in discussions of development, particularly its influence on community growth. For instance, Putnam (1993) and Putnam and Helliwell (1995) argue that social capital is the key to healthy communities. Putnam and Helliwell (1995) conducted a study that investigated if differences in social capital endowments resulted in differences in the establishment and maintenance of output per capita between two regions of Italy. They used a proxy for social capital consisting of indices of a) the extent of civic community, b) various direct measures of the effectiveness of regional government and c) citizen satisfaction with their regional governments. Their results indicated that communities that have higher levels of social capital (e.g. northern regions of Italy) do well, while those lacking social capital suffer political disengagement and a host of social ills. These results confirm that institutions matter, and that social capital is a community level attribute. Some researchers have also supported this notion by elaborating that the presence of social capital is often explained by the density of civic, religious, sports and recreational organizations in a region (Putnam, 1993).

Consequently, it is these measures that have been used to draw strong conclusions about the possible consequences in a community.

Apart from the presence of social organization and how communities participate in them, the social capital within an area can also be measured by institutional features such as trust, norms and networks. Some researchers have taken this side of the social capital's definition to investigate if in this regard social capital has economic payoff. For example, using indicators of trust and civic norms, Knack and Keefer (1997) presented evidence that 'social capital' matters for measurable economic performance. According to these researchers, situations where goods and services are provided in exchange for future payments, employment contracts in which managers rely on employees to accomplish tasks that are difficult to monitor, and investments and savings decisions that rely on a third party's assurance to deliver are all based on trust (Knack and Keefer, 1997, p.g 1252). Thus the ability to engage in community development, sustainable or otherwise, depends in large part upon the existence of social relationships or networks that enable community organization, problem solving and decision making (Flora 1998).

Rupasingha et al. (2000) also support this kind of work. Using the density of various types of associations, measures of financial support given to charitable organizations, participation in elections as well as crime rates as the explanatory variables they estimated a linear regression model to examine the impact of these measures of social capital and other control variables on the rate of economic growth. Their results show that social capital is a positive and significant determinant of U.S. county per capita income growth. One of their major propositions was that the presence of social capital helps reduce information and transaction costs, especially when it involves the gathering and dissemination of information. In conclusion,

tracking progress in sustainable development requires paying attention to both indicators of environment and community health (Hodge 1996). For instance, if the general physical health and social well-being of individuals in the community is poor, sustainable community developments are not possible even with the most integrated and complete resource management regimes (McTiernan, 1999). Thus, social capital is an important aspect for community development, either as a means to an end or as an end in itself. Social capital however cannot be created instantly, but takes time to develop and if not used can be eroded.

Westlund (2003) emphasizes the need to have structures within societies that help perpetuate the development and use of social capital. A good example is the presence of social economy enterprises. SEEs are known to be creators, preservers and reorganizers of social capital, which has a crucial influence on community growth processes. Thus, certain kinds of social structure are especially important in facilitating some forms of social capital. For example, networks are usually informal groups of people who know each other, such as villagers who help each other at harvest or neighbors who help each other cope with problems (Shragge and Fontan, 2000). As we discussed in the first chapter of this study we take co-operatives as a well defined form of social economy enterprise. Thus the following section defines social economy enterprises and co-operatives followed by a summary of the role of co-ops in community growth and vitality that past studies highlight.

2.3 Canada's Social Economy

2.3.1 Defining the Social Economy

According to the Organization for Economic Co-operation and Development (2003), the social economy , synonymously referred to as the 'third sector' or the 'non profit sector' describes a variety of socio-economic initiatives addressing new opportunities and need that the

private sector and the government do not seem to cater for sufficiently. The term derived from the French term *économie sociale* is known to have been first recorded about 1900. Although the social economy has been in existence worldwide, it has only been recently that interests have emerged in socio-economic development and policy making debates both in North America and Europe.

Other researchers, for instance Quarter (1992) narrowly define the social economy as businesses such as co-operatives, credit unions, mutual insurers, not-for profit corporations and unincorporated associations that are democratically governed by their members or stakeholders to produce and deliver goods and services in the market place. A variety of definitions are found in the literature, and there seem to be lack of consensus to what the social economy should really be. For this study, Quarter's definition is more appropriate. Quarter (1992) elaborates that the social economy usually develops because of a need to find new and innovative solutions to issues (whether they be socially, economically or environmentally based) and to satisfy the needs of members and users. He views the social economy as a term that implies an integrated system of institutions working towards common social goals. As the Policy Research Initiative (2005) clearly illustrates, in Canada the interest in the social economy was born out of the response that the government saw on how social economic enterprises have been fighting the challenges brought about by globalization and the resulting economic restructuring.

2.3.2 Role of Social Economy Enterprises (Co-operatives) in Community Growth

As the most pervasive form of social economy enterprises in Canada, co-operatives can be seen as the medium through which socio-economic disparities can be addressed (Fulton and Ketilson, 1992). A standard definition of co-operatives fits well with this framework

Co-operatives are any business or service that is jointly owned and democratically controlled by its members for their mutual benefit (Gertler, 2001). There is a growing literature arguing that co-operatives can be effective at community development.

For instance, Brown (2001) elaborates that social economy enterprises such as co-operatives enable community cohesion. She describes cohesion as the sharing of a sense of community identity and purpose that enhances the ability of communities to work together. Using a social audit of the role of co-operatives and credit union, Brown documents that co-operatives and credit unions affect a community's financial capital (e.g. through providing employment, products and services), human capital (e.g. fostering learning and growth for individuals as well as avenues for leadership development), and social capital (e.g. people working together, connecting and building trust).

The role of co-operatives in community growth has also been outlined in a study on co-operatives in Saskatchewan by Fulton and Ketilson (1992). Using the concept of the central place theory, and a survey administered in communities around the province, they found co-operatives to be the providers of goods and services that would otherwise not be provided in some small communities. They ascertained that the presence of co-operatives gives birth to "places" where people discuss social issues as well as offer support to each other. The presence of social activities is fundamental in sustaining a community. Thus co-operatives were found to play both a social and economic role in Saskatchewan communities.

In a case study field research on the factors that affect the ability of co-operatives to enhance sustainable development and environmental management, Gertler (2001) elaborates that although co-operatives operate in areas that have various impediments (for example in term of community development most co-ops are concentrated in housing, transport, health care and so

on, where there might be issues surrounding operations), they can be important contributors to sustainable development. His proposition is derived from the way he refers to sustainable development as "development that enhances quality of life without jeopardizing the ability of other populations, or of future generations, to access the resources needed for their own development" (Gertler, p.g 2). Overall, Gertler argues that co-operatives are able to adopt the more integrated and holistic mandates of sustainable development. In a similar study, Ketilson and MacPheson (2001) examined the status quo and potential for growth by Aboriginal co-operatives. Their report outlined that by pooling their community and individual resources together, the aboriginal co-operatives across Canada, particularly those in the northern region of the Arctic, mostly Inuit and Inuvialuit, have contributed to the development of physical and personal[6] infrastructure within communities. Additionally, co-ops enhance the development of social capital that strengthens Aboriginal communities.

Some researcher have also put forward that co-operatives play an important role in the social cohesiveness of the communities. Co-operatives promote citizen engagement, social cohesion and trust by providing ordinary citizens a chance to influence the decisions that affect their lives. The democratic process typical of co-ops allows for inclusion and empowerment of all social groups, providing an equal say and equal opportunity, and often bringing marginalized people into the mainstream of a nation's economic and political life (Fairbairn, 2004; Lévesque et al., 2004). As the Co-operative Secretariat (2005) puts forward, "co-operatives are a proven tool for mutual self-help, allowing people to work together towards common goals". This in turn helps build social cohesion by promoting inclusion, trust and equity among citizens.

[6] Personal infrastructure is enhanced through education, training and leadership development activities.

Present day co-operatives have been instrumental in addressing many socio-economic challenges- including the needs of aboriginal and immigrant groups, youth, disabled persons, and low-income communities.

Co-operatives as forms of social economic enterprises subscribe to a set of core values and principles which emphasize social responsibility and community development. These are foundations brought about by the social capital within a community (Restakis and Lindquist, 2001). As alluded to in previous passages, a connection is defined as social capital only if it includes elements of networks, trust specific to that network and the network must enable access to resources. In that vein co-operatives represent forms of social capital in that they mobilize, train and develop community members and leaders, and link the community and its interests to the market economy. Gertler (2001) supports this notion by indicating that co-operatives can promote economic democracy and the empowerment of marginalized groups. In this manner he strongly believes that such connections make the foundation for sustainable development and as a precondition for shared responsibility by community members.

2.4 Insights from Literature

This chapter has provided a critical appraisal of literature that is available on the determinants of population change and the role of social capital, SEEs and co-ops. Past studies have shed light on some of the known community growth measures. This is helpful in the preparation of the expected direction of influence of the variables that were chosen for this research. Previous research has revealed the type of variables that we use to represent the presence of social capital in a given community. The literature review has helped highlight the possible contribution of this research. It is apparent that there is a gap in the literature in terms of the empirical estimation of the population growth impacts of social capital (proxied by co-op

activity). The literature has also highlighted that co-operation is an expression of, and an investment in, social capital, which help strengthen our proposition that is the basis for this study. The following chapter provides the theoretical framework utilized in this research.

CHAPTER 3: THEORETICAL FRAMEWORK

3.0 Introduction

This section provides the theoretical framework for analyzing the location decisions made by households and firms. These location decisions will determine population growth. The section will begin by discussing a general equilibrium model for these decisions. This is followed by an explanation of the respective ways in which the model was adapted in this study to explain how firms choose locations where costs are minimized, and households move to places were expected utility is higher. We conclude the chapter by applying this model to our study.

3.1 Theoretical Model

The theoretical framework for this study is derived from a simple general equilibrium model of explaining firms and household location decisions among various regions, following from Roback (1982). Roback stresses the interdependence between the decisions of firms and households in determining interregional wage and rent differentials. In her model, she illustrated the influence of amenities on the production and consumption decision choices made by firms and households respectively. Further, she deciphered the simultaneous determination of wages, rents and amenities in the labor and land markets.

Following Roback (1982), subsequent literature (e.g. Beeson and Ebert, 1989; Voith, 1991, Partridge et al., 2006a, b) has depicted location decisions of households and firms as being guided by utility maximization and cost minimization principles respectively. Subject to moving costs, it is assumed that there is free mobility of individuals and firms across regions. Regions are taken to be endowed with location–specific amenities. Firms in the regions produce a composite consumption commodity that household consume. Households and firms choose their

locations, including the decision of whether to remain in their current location or re-locate, until there is no further advantage to be gained (in terms of reduced costs for firms or increased utility for households). In this process wages and rents adjust in response to households' and firms' moves.

Taking social capital as a special kind of amenity that enhances the quality of life within communities, higher levels of social capital are expected to make a community a more desirable location more attractive and thus positively impact community population growth. For example, it may be assumed, *a priori,* that social capital brings about more desirable neighborhoods (e.g. low crime rates).

Another important aspect is that social capital may be a productive asset that helps locate firms where there is a market (customers) as well as workers. Some researchers, e.g. Westlund (2006) put forward that employees who have a sense of belonging and working towards the good of everyone contribute to the forming of a firm's social capital. This reiterates the point raised in earlier discussion that social capital progresses from certain kinds of structures. Firms also make further investments in good internal relations with suppliers and development partners to lower costs of production.

However, caution has to be exercised when describing the positive role of social capital, as other researchers have found certain kinds of social capital to have negative externalities on communities, for instance neighborhood gangs and drug dealers (as negative examples of high levels of social capital) are most likely to repel populations (Woolcock, 2000). Further, there are limitations to what social capital can do. Social capital alone cannot build the social economy and develop communities. It has to be used in conjunction with other forms of capital—financial, human, environmental and cultural.

3.1.1 Household Location Decision

Households are taken to be rational decision makers whose tastes and skills are identical. We assume their location decisions are determined by a host of factors such as area specific market goods *(X_i),* amenities (*A_i)*, social capital (*SoC_i)*, favorable economic conditions *(E_i)* and respective distance (D_{ij}) to areas where they may access higher order goods and services, as well as employment. For instance, utility levels will be positively related to the presence of manmade amenities such as availability of convenient shopping centers, recreational facilities as well as from natural amenities such as desirable weather conditions. Additionally, the community population size may also provide household amenities through achieving threshold sizes that support higher business retention. On the other hand community size can lead to agglomeration effects which help attract firms (Blomquist et al., 1988).

Social capital in community *i (SoC_i)* is a function of the households' personal social capital, the households' allocation of time to producing this particular good through being affiliated with clubs, households' own characteristics and the characteristics of the households in surrounding communities. It is assumed there is a positive relationship between the level of social capital in a community and household utility in a given locality. Thus if social capital is absent it becomes a barrier to movement.

We hypothesize that the vector of economic conditions positively impacts utility through increasing the probability of households finding employment and increasing access to consumer goods. Distance from higher level urban centers is expected to be a hindrance factor due to increase in costs of accessing both employment opportunities and also the higher order good and services. Households are constrained by the employment wage (Y), which is determined by the wage rate (W_i), rentals for housing (R_i) and prices of other household market and non market

goods (P_i) such as other household consumables, the opportunity costs for obtaining information, desire for clean air and environment, etc., all in community *i*. The household's indirect utility maximization problem is therefore represented by equation 1 as:

$$V(P_i, W_i, R_i, X_i, A_i, Soc_i, E_i, Dist_{ij},) = \max (U_i (X_i, A_i, Soc_i) \text{ subject to } Y (P_i, W_i, R_i, E_i Dist_{ij},) \quad (1)$$

For households to have a preference for one community *i* over another *j*, after accounting for moving costs (m_{ij}), they compare the bundle of community attributes between the two communities as represented by equation 2. If

$$V (P_i, W_i, R_i, X_i, A_i, Soc_i, E_i, Dist_{ij},) < V(P_j, W_j, R_j, X_j, A_j, Soc_j, E_j, Dist_{ij},)-m_{ij} \quad (2)$$

then households have an incentive to move, thus they relocate from community *i* to community *j*. In reaching a new equilibrium, the flow of households affects the wage levels and land rents in both the source and destination communities. We assume that the amenities in each community remain unaffected. In the long run, equilibrium is characterized by the fact that no more gains can be achieved from moving from one community to another and households become indifferent among locations (that is actual utility and expected utility is equal in all locations). However wages and rents will vary to reflect the collective valuation of the community's amenities.

3.1.2 Firm Location Decision

Firms choose locations based on the expectation of producing a numeraire good *X* at minimum cost (C_i), subject to a production function (Q). Capital is assumed to be completely mobile and production technologies are assumed to be identical across firms. Closely related to the cost of production are wages (W_i) to be paid to households in return for labor[7] as well as rents

[7] In this research we assume there are no commutes so that firms employ local residents in the production process.

(R_i). The firm's production function is affected by the competition for land (L_i) and the population size (N_i) which is the labor force as well as determinant of demand for the firm's goods and services. Access to the market, access to a labor force, and access to inputs will be affected by distance from higher tiered centers (*Dist*). In line with the research objectives, we hypothesize that social capital (SoC_i) will be positively related to firm productivity in lowering costs of production through a reduction in transaction costs (trust relationships, lower costs), as well as providing information on where there is demand (customers). We assume constant levels of amenities (A_i^f) in a community. Amenities that attract firms may be different from those that attract households. In either case, amenities will tend to raise land rents. The resulting rental prices act as repellent forces. In the short term there may be differences in the firms total cost of production related to differences in wages and rents. The cost minimization problem is expressed by equation,

Min C_i (W_i, R_i, SoC_i, A_i^f) subject to a production function $Q=f(Dist, L_i, N_i)$ (3)

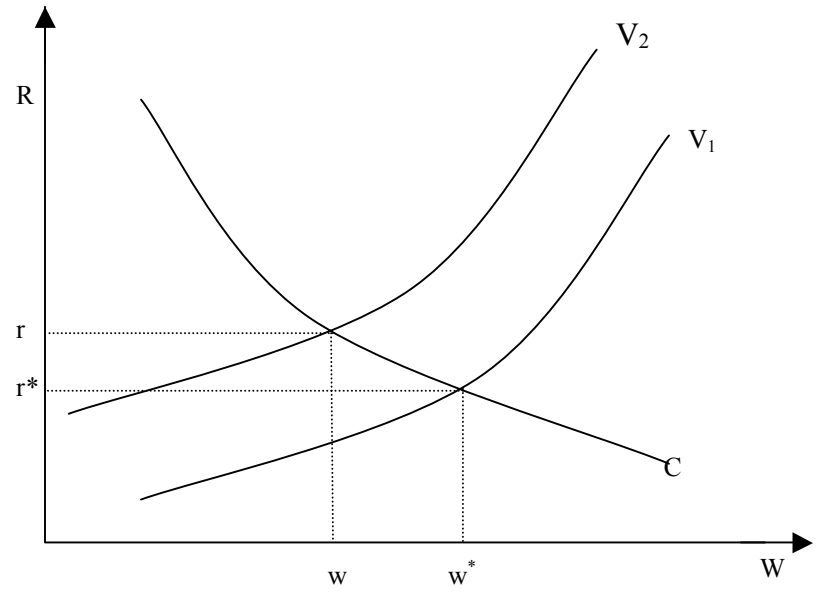
The short term adjustments consist of choosing a location to minimize the cost of production, *C*. If costs of production are higher in region *i* than *j,* firms move from *i* to *j.* In the long term firms will be indifferent among locations as the cost of production will be equal in all location.

3.1.3. The Equilibrium Conditions

As households and firms, in the short run, respond to differences in economic conditions when making their migration decisions, they restore equilibrium over space. The upwards sloping curve (*V*) in figure 3.1 is the isoutility curve, showing how households will accept tradeoffs in rents and wages for a given level of amenities, for example, in the community. On the other hand the downward sloping curve, C is the isocost curve showing the rents and wages that equalizes unit costs. Figure 3.1 below illustrates how the respective isoutility and isocost

curves result in the market clearing conditions for wages (*w**) and rents (r*) at a given level of household amenities.

Figure 3.1: General Equilibrium Model for Varying Household Amenity Levels



Adapted from Roback (1982)

The model can be used to illustrate the impact of varying levels of amenities on wages and rents. Suppose the presence of co-operatives in a community contributes to household amenities through creation of trust and a sense of belonging, *ceteris paribus,* (upward shift of V_1 to V_2). Consequently, land prices, r increase from r* to r, whilst wages decrease from w* to w. For every level of rent the households are now willing to accept a lower wage rate as they are compensated by the higher level of amenity, V_2. Thus prices and rents constantly adjust to the varying levels of amenities. Focusing only on the isoutility curve for the moment, higher levels of amenities can result in higher rents and lower wages.

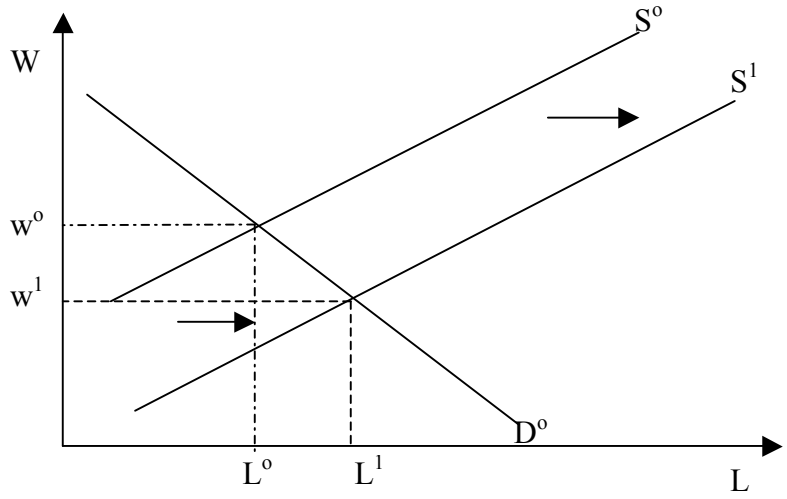
3.2 Application of the General Equilibrium Model

Since this research is examining the role of co-operatives in community population growth and vitality, the Roback model can be used to show a labor market disequilibrium

situation that follows from differences in communities' co-op activity. Suppose there are two communities A and B whose differences in co-operatives activity manifest in differences community characteristics that make it a desirable location for households. For instance suppose the presence of housing co-operatives in community B enables lower middle income households to be house owners as well create a sense of belonging.

Thus assuming this co-op presence may be positively related to community growth, *a priori*, an increase in the level of co-op activity in community B result, relative to A, in households moving from A to B. In community B, the influx of more households as illustrated by figure 3.2 shifts the labour supply curve from S^0 to S^1. Employment labour supply increases from L^0 to L^1, reducing wage levels from w^0 to w^1. Lower wages, *ceteris paribus,* may retain a greater population as firms are willing to hire more workers.

Figure 3.2: General Equilibrium Model Application to a Labor Market Framework



On the demand side, community B may also be more attractive to firms, *ceteris paribus,* as higher social capital level through co-operative activity reduces the costs of production through a reduction in transaction costs. If productivity increases, firms would require more

workers and the effect would be reflected in a shift of the demand curve to the right, subsequently creating a new wage and employment equilibrium.

The theoretical framework discussed above has been used to show how co-operative activity might affect population growth in the community. If increased co-operative activity contributes significantly to the stock of social capital, we would expect an impact on labor demand and supply. If co-operatives are instrumental in this way, more co-op membership would, through increasing social capital, make the community a more desirable residential location for households and/or a more profitable location for firms. Increasing a community's attractiveness would be expected to lead to net in-migration and thus population increase.

CHAPTER 4: METHODOLOGY

4.0 Introduction

This chapter provides a description of the empirical estimation used in this research. It begins by exploring the model used to test the proposed hypotheses, then goes on to cover the data sources, and where applicable how the data were constructed. The expectations with respect to the estimated relationship are presented. The chapter also briefly discusses the advantages and pitfalls of our estimation technique. We conclude by giving a summary of the chapter.

4. 1. Empirical Model

Central to the theoretical models of population change, net migration reveals the way households respond to economic incentives and access to amenities. The proposition is also supported by empirical studies which emphasize a variety of financial, economic and amenity measures to try and explain the variations in population change over space. As previously defined in the theoretical framework section, the spatial distribution of population growth defines how rational individuals/households choose regions where their utility will be maximized in combination with firms choosing cost minimization locations (Roback, 1982, Beeson and Eberts, 1987).

A model of population change as a measure of growth for a given community is used. For instance, population growth reflects the fact that a given community is relatively attractive to actual and potential residents resulting in people "voting with their feet" and moving to this community. The opposite applies when a community is unattractive. Population change is modeled to be influenced by a vector of predetermined economic, demographic and amenity characteristics. While the major concern is with the net migration component of population change, total population change will also include population changes due to natural increase. It is

assumed that total population change is a reasonable representation of the net migration component of differences in community population growth. The choice of dependent variable, percentage population change over a ten year period, corresponds to Partridge and Rickman (2003) as well as Ferguson et al. (2007). In their work, they showed that net migration is a good measure of the growth of an area because it is the avenue through which households reveal their preferences as specified in the theoretical model. Equation 4 specifies how the general population change model will be represented in this study.

$$\%\Delta P_{2001-1991} = f(Agglom_{1991}, Econ_{1991}, Amen_{1991}, SoC_{1992}, \Pr ovDum, e) \quad (4)$$

The dependent variable, $\%\Delta P$, is the percentage change in population between 1991 and 2001. While the theoretical model is based on household decisions, we observe the effect of their decisions in terms of population movements, thus assuming a constant population-to-household ratio across communities. **Agglom** is a vector that contains variables measuring distances to urban areas of different sizes as well as some population measures; the **Econ** vector contains variables describing the employment and industry share explanatory variables in our model; the **Amen** vector contains a set of physical and natural amenity variables and; the **SoC** vector contains co-operative activity variables from measures variously constructed as simple counts of co-ops, number of people who are fulltime employees in the co-ops, and intensity of co-operative activity measured as co-op membership per capita. With BC as the omitted variable, **ProvDum** denotes a set of nine provincial dummy variables to control for provincial differences.

4.2 The Dependent variable

The dependent variable is the percentage change in population between 1991 and 2001, denoted **91-01_POP_CHANGE**. Equation 5 illustrates how this variable is computed.

$$\mathbf{POP\_CHANGE} = (\mathbf{POP}_{2001} - \mathbf{POP}_{1991}) / \mathbf{POP}_{1991} \quad (5)$$

$\mathbf{POP}_{1991}$ and $\mathbf{POP}_{2001}$ represent the total population of a given CCS in 1991 and 2001 respectively. The analysis is undertaken for rural and urban samples separately as we believe the population dynamics may be fundamentally different. For our study urban is defined to consist of centers of population 10,000+ with the remainder being rural. We adhere to this distinction based on other studies as well as to reduce random measurement error. Due to Statistics Canada random rounding processes, small changes are greatly magnified where the population base is small as in many rural communities. We thus opt for a relatively inclusive definition of rural.

4.3 Explanatory Variables

4.3.1 Agglomeration Indicators

In our agglomeration factors we used a number of measures of distance to urban centers of different sizes. First we explored the distance, in kilometers, from the centroid of a given Census Consolidated Subdivision (CCS) to the nearest Census Metropolitan Area (CMA[8]) denoted **DIST_CMA_100K**. For a rural community, this variable is taken to be the distance from the centroid of the rural CCS to the centroid of the nearest Census Metropolitan area. In this study communities are classified as rural if they do not geographically overlap part of a census metropolitan area, or a census agglomeration. For an urban CCS that is part of the CMA we take the distance as zero, and for an urban centre that is not part of the CMA the distance is measured from the centroid of the urban CCS to the centroid of the nearest CMA. Partridge et al. (2007) elaborate that the distance effect for CCS that are within an urban area is taken to reflect offsetting effects of concentration, sprawl or commuting distances.

[8] A census metropolitan area (CMA) or a census agglomeration (CA) is an area consisting of one or more adjacent municipalities situated around a major urban core. To form a CMA, the urban core must have a population of at least 100,000. To form a CA, the urban core must have a population of at least 10,000. Accessed at http://www12.statcan.ca/english/census01/Products/Reference/dict/geo010.htm

We also utilized the incremental distance from a CMA to a larger urban centre of 250,000 people. This variable is utilized as **CMA_DIST_250K** in this research. For incremental distance this variable is computed by subtracting **CMA_DIST_250K** from **CMA_DIST_100K.** Lastly our distance measure incorporated the incremental distance from an urban centre of 250,000 people to an urban centre of 500, 000 people, denoted as **CMA_DIST_500K**. *A priori*, these distance variables are expected to be inversely related to population growth in CCS_i . In other words, more remote places are less attractive to residents and firms. The distance (and incremental distance) represents the costs (and incremental costs of) access to successively high level urban centers offering higher order goods and services and employment in urban areas. Improved access is hypothesized to lead to increased productivity and better growth potential.

With regards to population of size measures three variables were employed: (1) the nearest/own urban centre, **NEAREST/OWN_CMA_91**, to measure the effect of the nearest/ own urban centre's population size on CCS population growth; (2) the 1991 population of a given CCS, **OWN_CCSPOP_91**, to help predict how own CCS's conditions impact on growth potential and lastly (3) the population of the surrounding CCS, **POP_SURR_91**, as a measure of the positive (negative) spillover effects that neighboring CCSs have on adjacent CCSs. These population size variables are a way of representing the size and/or scale effects of urban agglomeration advantages. We expect these variables to be positively related to population growth to reflect the importance of local agglomeration economies or locating near agglomeration economies that generate positive spillovers. Similar measures of population size were computed for 1981 population data for use in the sensitivity analysis.

4.3.2 Economic Indicators

The economic indicators constitute important control variables used in this research. These are fundamental components of the model because the relative desirability of a community will be partially based on current economic conditions. Economic theory proposes that individuals/households make an implicit cost-benefit calculation when considering a change in location, such that the most favorable option is chosen. The main variables included are employment, income and demographic variables.

The economic variables include the unemployment rate - **UNEMPLOY_RATE_91**; the employment rate - **EMPLOY_RATE_91** and the share of population above the age of 15 who are employed in agriculture - **SHARE_AGRIC_EMP_91**; share employed in other primary industries - **SHARE_PRIM_EMP_91**; share employed in the manufacturing industry - **SHARE_MAN_EMP_91** and non-farm self-employment share - **%NONFARM_EMP_91**. We define the unemployment rate as the number of unemployed persons divided by the labor force, that is, the number of people who are above the age of 15 years. Only one of these (unemployment or the employment rate) variables will be included in the model as each is a proxy for the probability of finding employment at that location.

All things being equal, a high unemployment rate is a proxy for weak labor demand, therefore one would expect households to be repelled by communities with such characteristics. Likewise, a relatively low unemployment rate might act as a pull factor (Yankow, 2003). However, when in combination with a high labor force participation rate, there is a limit to the number of new jobs filled by new migrants (Partridge and Rickman, 2003). The employment rate is the preferred representation of the probability of finding employment. It represents both the local participation rate and the success rate of finding a job.

The percentage of the population that is employed in the agriculture sector- **SHARE-AGRIC_EMPLOY_91** - is included to measure the influence of the agricultural sector concentration on population change. Given that the agriculture sector is declining in importance as a source of employment, due to a substitution of machinery for labor in agricultural production, we expect a negative relationship between the share of people employed in the agriculture industry and population growth. We also included the share of people employed in the primary industry sectors- **SHARE_PRIM-EMPLOY** such as mining, forestry and fishing industries, where the same negative relationship is expected as all primary sectors are becoming less labor intensive. Another major employment proxy used was the share of the population employed in the manufacturing industry-**SHARE_MAN_EMPLOY**. The relationship between this variable and population change is ambiguous. For instance if the industry is dominated by routine manufacturing activities, we expect a negative relationship with population growth largely due to the loss of employment as labor saving technologies are employed. On the other hand, as Bollman and Prud'homme (2006) indicate the general decline in the cost of transporting goods implies that remote places such as rural areas may have the ability to compete with urban areas in locating manufacturing firms. If there is a general migration of manufacturing to rural areas, a higher manufacturing share could exert a positive influence on population growth in rural areas.

Non-farm self-employment share- **%NONFARM_EMPL** is included in the model to proxy entrepreneurship. We expect this variable to be positively related to population growth as greater local entrepreneurship can be a way to increase local income-earning opportunities and this make them more attractive locations for households. This is an important variable to be

added to the rural model because many rural economies rely on the primary sector, which have experienced employment losses (Partridge, 2002 and Ferguson et al., 2007).

Two income concepts were also employed under the economic indicators. The first is the per capita total money income - **PER_TOT_INC_91** received from all sources, broadly identified by Statistics Canada as market income and government transfers before deduction of income taxes. We include government transfers in our definition of the income variable following after Day (1992) who found that intergovernmental transfer payments and provincial natural resource revenue have the potential to influence migration flows. In all, one would expect higher income to act as a pull factor, especially for the highly skilled labor force. The other component to measure a community's economic status is proxied by the share of residents below the poverty line - **SHARE_LICO_91**. It is expected that the coefficient for this variable will be negative in the population equation,[9] signaling that depressed areas are not attractive migration destinations.

Human capital characteristics of the community are represented by the percentage of individuals over 15 years old that fall into five education attainment categories, that is, individuals with less than grade 9- **SHARE_G9;** individuals who reached grade 13 but have no diploma -**SHARE_G13;** those with a high school diploma- **SHARE_HSDIP**; individuals with at least a post secondary education- **SHARE_POSTSEC-EDU**, to individuals with at least a university degree- **SHARE_UNI_DEGRE_91**. From the full set of education variables investigated, we included the share of population with a university degree university degree. Variations in education levels reflect differences in type and skill level of employment, willingness to move to places, as well as susceptibility to be laid off in during adverse economic

[9] Henry et al. (1997) found strong evidence that new residents avoid areas with a high percentage of residents that are poor. Additionally, Roback (1982) indicated that the poverty incidence variable help capture differences in family background and schooling quality as well as control for differences in within-city differences in amenities.

market shocks. This variable is also important as a measure of the quality of the local labor market pool. We expect firms to be attracted to a higher quality labor pool thus the higher the percentage of the labor that has attained a university degree, the greater the expected population growth. It should be noted, however, that this may also lead to higher cost labor, thus perhaps offsetting the human capital benefits for community population growth.

Finally, under economic variables, we included the share of aboriginal populations - **SHARE_ABORIG_91**. As postulated by Bollman (2006) and others, aboriginal populations are the fastest growing in Canada, thus positively influencing economic growth (agglomeration economies). Unlike most of the other factors discussed here, this is a 'natural increase' component of population change.

4.3.3 Amenities

Under amenity indicators we employed a combination of climate/weather variables such as total hours of January sunshine - **JAN_SUNSHINE**; average mm of snowfall- **SNOW_COVER;** average annual precipitation - **ANN_PRECIP;** mean January temperature- **JAN_TEMP** and average July relative humidity - **JULY_RH.** We expect areas with favorable weather such as warmer temperatures, more sunshine days, low average snow falls and areas with low relative humidity to attract populations. Following after Ferguson et al. (2007), most Canadian studies utilize January temperatures due to the homogeneity of summer sunshine and temperatures. In addition a number of non climate related variables (public safety, health related as well as recreational activity variables) are included to represent the built amenities characteristics of the community. For public safety we used variables such as the per capita number of police stations within a given CCS - **PERCAP_RCMP,** as well as the per capita number of security services available in the CCS - **OTHER_POLICE**. Community safety and

security is hypothesized to enhance the attractiveness of a community. On the other hand, if the police services are absent we expect this to act as repellent forces as households consider these a deterrent to human safety.

We also recognize the importance of health care facilities in the location decisions. A number of these were investigated and in per capita measures are; the number of acute care hospitals - **PERCAP_ACUTECH**; number of long term health care facilities - **PERCAP_LONGTMH**; number of nursing stations -**PERCAP_NURSTN**; number of outpatient clinics - **PERCAP_OUTPATIENT** and number of community health centers - **PERCAP_COMHC**. We also employed the respective distance measures for each one of the proposed built amenity variables described above. The greater the distance to health care facilities the lesser the attractiveness of the community.

Lastly, included under the amenity indicators were variables proxing for the recreational activities/facilities available per given CCS. We used per capita measures for: total movies theaters/cinemas - **PERCAP_CINEMA**; total number of tourism sites - **PERCAP_TOUR**; total number of educational institutions such as universities - **PECAP_UNIV_EDU** and total number of golf courses - **PERCAP_GOLF**. In general it is expected that positive amenities such as shopping and recreation centers are positively related to population growth. The amenity variables will be important control variables since studies have shown the increasing importance of amenities to population location decision (Rappaport, 2004; Ferguson et al., 2006). However there might be a limited response to natural amenities variables since Canada's population is crowded along its more climatically and topographically hospitable borders (Partridge, 2005).

4.3.4 Social Capital Indicators

Social capital indicators to be discussed here form the key explanatory variables of the empirical model. One of the major hypotheses to be tested is whether the presence of co-ops in communities, controlling for the economic, geographic and amenity variables, will be positively related to subsequent population growth. Thus using co-operative activity variables as indicative of the presence of social capital, these variables are essential in testing the hypotheses of this study. Using data from the Co-operatives Secretariat, dummy variables were used to indicate the presence of a co-operative per given community. A community with at least one co-operative is assigned 1, while communities that do not have any co-operatives are assigned a 0. All other things being equal, it is hypothesized that a community with co-op activity, to the extent that this contributes to, or is a reflection of, the community's social capital, will more likely retain and attract households.

Another way of measuring the influence of co-ops is to use the density of co-operatives - **PERCAP_COOPS**. Specified in this way the greater the per capita incidence of co-ops, the greater the positive impact on population change. To capture potential positive spillover effects from co-operative activity in neighborhood communities, we make use of variables such per capita coops within say a 100km - **PERCAP_COOP_100KM** or per capita number of co-ops within 200km -**PERCAP_COOP_200KM**.

A more refined way of representing co-ops is introduced in the form of co-operative members as a share of total population per community. Co-ops can vary greatly in terms of their membership. Given the importance of membership in the co-operative structure, membership would seem to be a better representation of co-operative activity than simply the co-op itself. It may be that higher membership in co-operatives generates and supports the activities that comprise social capital. Westlund (2006) ascertains that affiliation in organizations such as co-

operatives can be synonymous with investment in human capital. Club/social organization affiliation yields economic and social returns for the individuals in the form of jobs, wages and a sense of belonging within communities. We thus compute the per capita number of people who are members of a co-op in each CCS -**PERCAP_MEMBER**, as well as the per capita membership from surrounding CCS - **PERCAP_MEM_SURR.** The surrounding membership variable captures the potential positive spillover effects from neighboring CCSs.

The various measures of co-operative activity noted above are used to draw inferences about the possible impact of co-operatives on community population change. Other potential co-operative variables represent alternative ways of measuring the size or strength of co-operative activity in the community are the share of population engaged in fulltime employment - **SHARE_FTCOOP_EMP** or in part-time co-op employment **SHARE_PTCOOP_EMP**.

One of the innovative elements of the analysis employed in this research is an assessment of whether particular types of co-ops or co-ops in different regions have differential effects. There appear to be differences by region in the prevalence of certain types of co-operatives. Therefore, the investigation will also differentiate co-ops by region, by type (worker, consumer and producer), and by industry category. For example figures 4.1 to 4.4 show the distribution of producer co-operatives across Western, Atlantic and Central Canada (Ontario and Quebec). It is apparent that producer co-ops are more densely concentrated in the Western region, especially Saskatchewan, largely due to the presence of agricultural activities.

We hypothesize that different types of co-ops may give rise to different responses in the communities. For example, general retail co-operatives may have different impact in small towns than co-ops dedicated to supplying farm inputs. Or maybe the new proliferating types like service or housing co-ops might be a new form of social cohesion.

Lastly, we incorporate the percentage change in population between 1981 and 1991- **%Δ91-81 pop**, as an explanatory variable in one of our sensitivity analysis to check if there is a persistent pattern of population decline. If there is such a pattern, including the lagged population change would absorb this influence, leaving the co-op variables to reveal the influence of the co-ops alone. The co-op variable coefficient would be compared with that in the base model (refer to section 5.2.5 for a detailed discussion on sensitivity runs) to assess whether the estimated co-op influence is affected by the inclusion of this trend variable.

Figure 4.1: Distribution of Producer Co-op Members in Western Canada

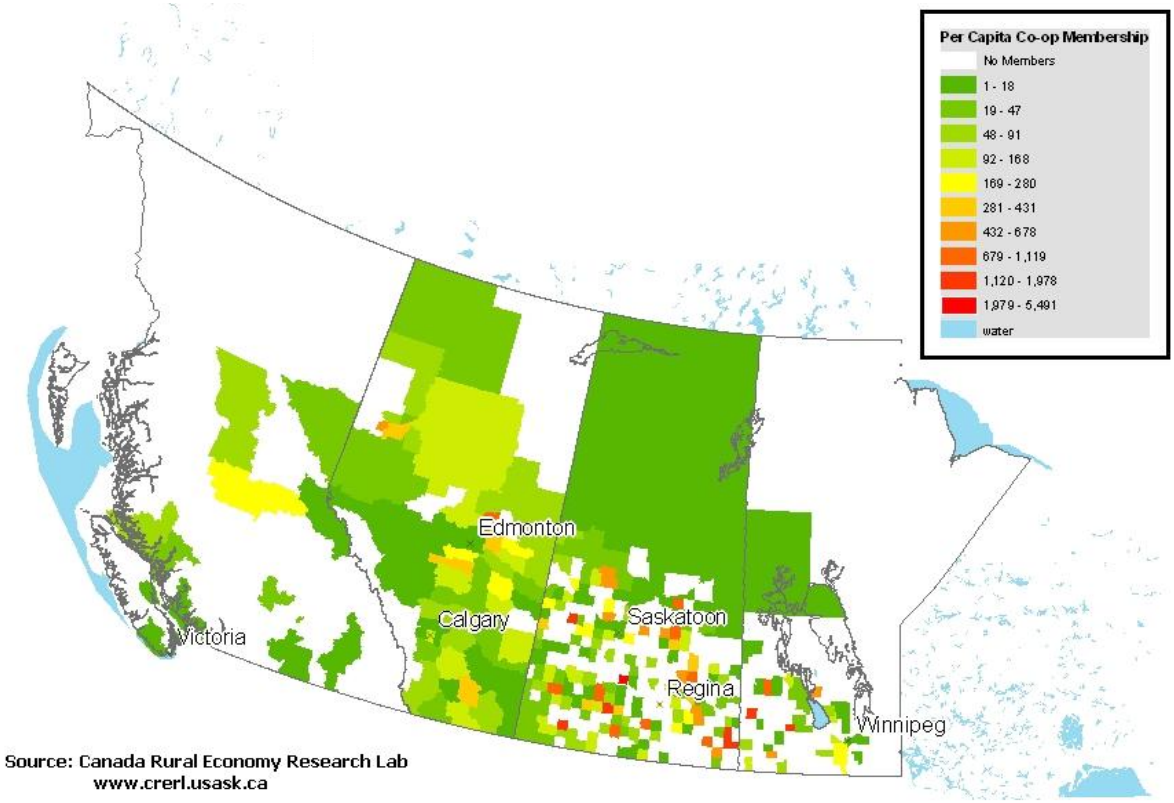


Figure 4.2: Distribution of Producer Co-op Members in Atlantic Canada

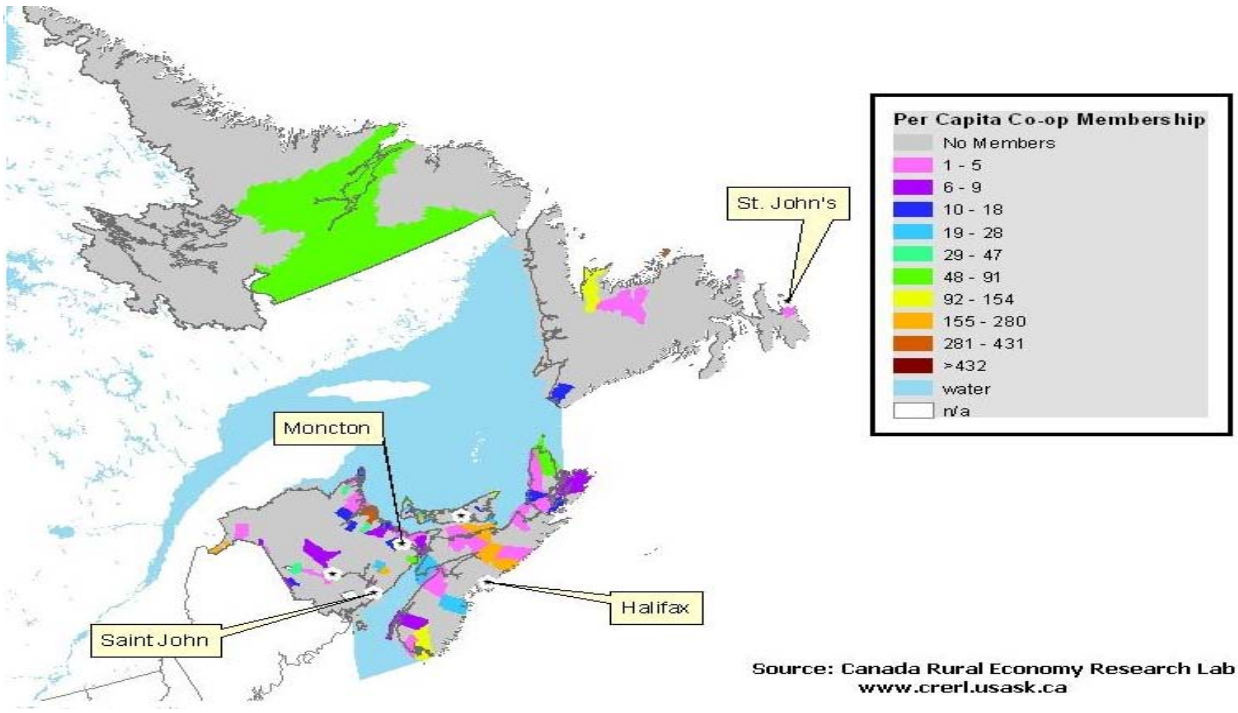


Figure 4.3: Distribution of Producer Co-op Members in Ontario

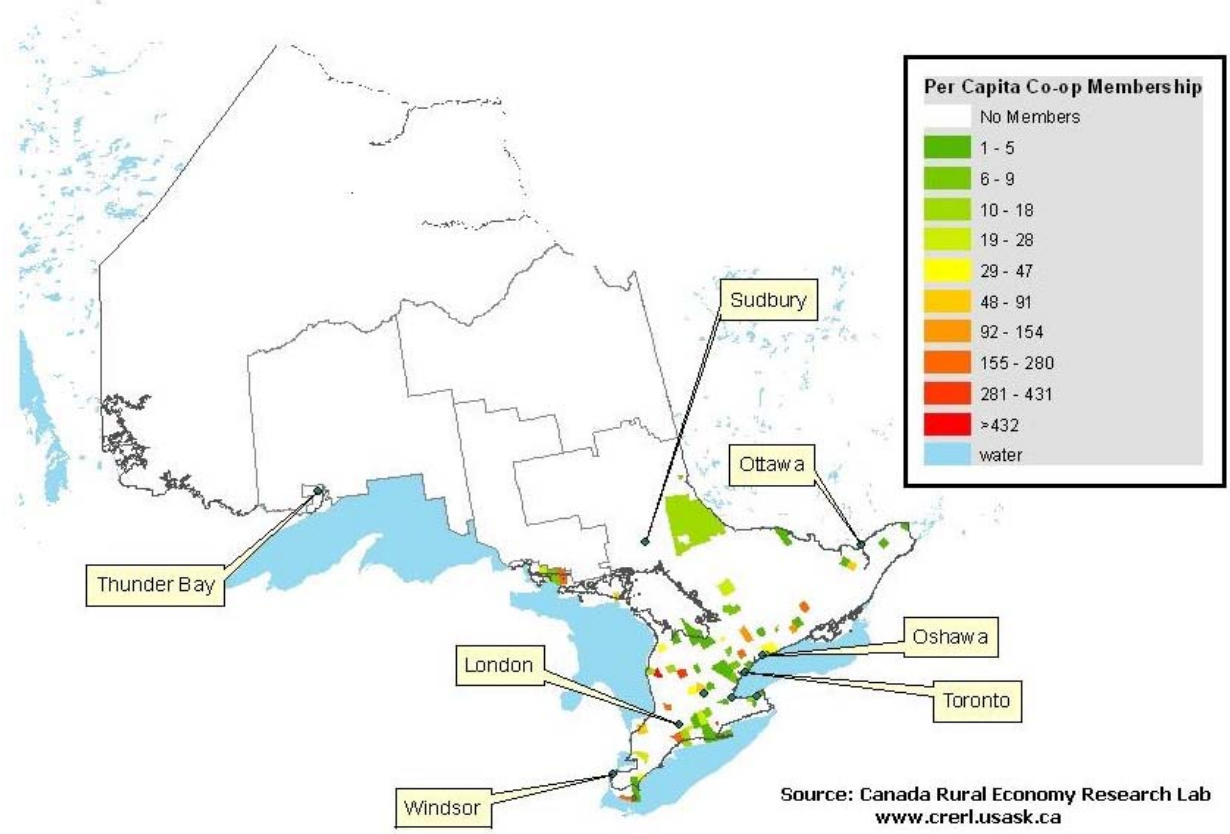
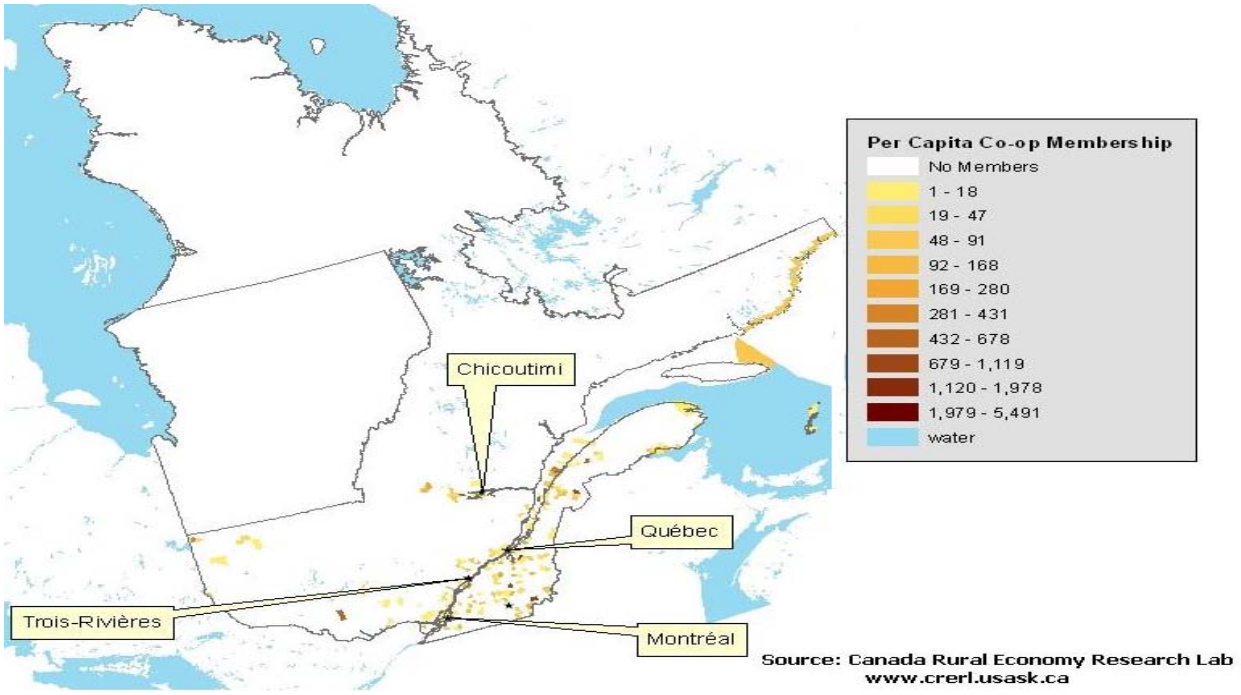


Figure 4.4: Distribution of Producer Co-op Members in Quebec



4.3.5 Provincial Dummy Variables

In this study we included provincial dummies to control for differences in the historic, legislative and institutional characteristics among provinces. As our crucial variables, co-operative activity exhibit major differences across provinces or regions. A good example of the possible reason for the differences is the variation in the legislation and jurisdiction governing co-ops in Quebec as compared to some provinces such as those in Western Canada (Birchall, 1997; Quarter, 1992). We therefore use dummy variables so that these differences may be captured in the model.

With British Columbia as the omitted variable nine provincial dummies denote were used. These are Saskatchewan (**D_SK**), Manitoba (**D_MAN**) , Alberta(**D_AB**), Quebec (**D_QC**), Ontario (**D_ONT**), New Brunswick (**D_NB**), Newfoundland and Labrador (**D_NFL**), Prince Edward Island (**D_PEI**) and Nova Scotia (**D_NOVASC)**. For the sake of brevity these provincial dummies will be represented as **PROV_DUMMY**.

4.4 Data Sources

Population data and a wide range of socio-economic variables were obtained from 1981, 1991and 2001 Statistics Canada census data. Amenity and geography variables were obtained from Environment Canada, DMTI database, the Data Library Initiative (DLI) and the Canada Rural Economy Research Lab (CRERL. Climate variables were sourced from weather station data from Environment Canada. All the data are aggregated at the CCS level with use of resources from CRERL. The sample has 2,086 CCSs in the rural sample and 516 in the urban sample. We omitted CCSs in the Northern Territories due to data limitations. The period under (1991-2001) investigation coincides with national census that gathers information on demographic, social and economic conditions across Canada. Further, the time span is also long enough to enable the caption of population movements, firms and capital (Partridge et al., 2006).

The variables representing co-operative activity were obtained from the Co-operative Secretariat. Two types of data sets will be utilized. First, a general dataset from which the Co-operative Secretariat collects information on all registered co-operatives (status of co-operatives, that is, whether they are still functional or not, the year in which the co-operative was begun and their types). This data set was used for mapping the presence and incidence of co-ops. Our analysis was based on the second dataset containing statistics obtained from the yearly annual mail survey of co-operatives (data on co-operative membership, employment, sales and asset endowments).

Although not all co-ops send in responses the survey has a 75% response rate which makes it feasible to generalize that the data set is representative of all the active co-ops in Canada, with the exception of the northern territories. Due to data limitations co-operatives data will be from the 1992 survey. While data for other independent variables is for 1991, it is assumed that 1992 for coops is closely comparable with 1991 conditions. It is important that the

right hand side variables be pre-determined, that is, prior to the observed population change, to avoid potential endogeneity.

4.5 Econometric Estimation

4.5.1 Empirical Estimation of Social Capital

A major obstacle in the investigation of the impact of social capital in empirical investigations is the lack of consensus on the precise definition, or the ambiguities associated with its conceptualization (Flint, 2006; Glaeser, 2000). Additionally, the measurement of social capital is a complex task, especially when empirical studies make use of individual level data to generate aggregate community representations of social capital. In this regard Durlaf and Fafchamps (2004) elaborate that individual returns to social capital are often poor predictors of aggregate externalities, yet in most cases researchers' measure social capital at an individual level, aggregated to provide a social capital measure at the community level. These issues are a result of lack of data which leave researchers with few options. Another common problem is that social capital is an endogenous variable, especially with reference to use of proxies such as membership in organization.

Our use of co-operative activity to capture (a part of) the social capital influence is a comprehensive assessment of the marginal influence of co-ops on population change. The relationship between co-operative activity and social capital is inferred from the nature and role of both co-op membership/activity and the nature of social capital. As represented in Figure 1.1 we expect an overlap between the two but there is not a one-to-one correspondence. The use of cooperatives to indicate social capital is an imperfect and incomplete representation. Nevertheless representing social capital in this way allows a rigorous empirical estimation that has been largely absent in the literature and may form the basis for future research.

4.5.2 Potential Econometric Problems

In making use of linear regression in the analysis of the impact of co-operatives on community population change, a number of assumptions are made. Our research makes use of cross sectional data and there a number of potential econometric problems that we have to address. First is the issue of linearity. We assume that the relationship between our dependent and independent variables is linear. However this assumption cannot be confirmed and as stated by Wooldridge (2005) multiple regression procedures are not generally affected by minor deviations from this assumption. In addition to this we assume our errors are normally distributed. In general violation of this assumption occurs when the sample size is small. With approximately over 2,600 CCSs in our sample we assume our data is sufficiently large enough to be unaffected by this condition. Potential concerns in any econometric estimation would be the issues of heteroskedasticity, endogeneity, multicollinearity, measurement error and omitted variables bias.

Gujarati (2003) specifies heteroskedasticity as a condition that occur when the variance of the residuals are not constant and thus violating the assumption of equal variance. The problem of heteroscedasticity is more likely in cross sectional data and will lead to inefficient though unbiased estimators. In our specification we used the *cluster* command in STATA to correct for heteroskedasticity. We cluster by Census Division[10] (CD) to reflect functional economic regions, within which the errors are most likely to be similar. The *cluster* command will produce robust standard errors, allowing valid inferences about the significance of the coefficients.

[10] Statistics Canada defines a Census Division as a group of neighboring municipalities joined together for the purposes of regional planning and managing common services. CDs are intermediate geographic areas between the province/territory level and the municipality (census subdivision). Accessed at http://www12.statcan.ca/english/census06/reference/dictionary/geo008.cfm

Another common problem in econometric analyses is the issue of endogeneity. Endogeneity occurs when the value of an independent variable is affected by the value of the dependent variable. For instance, in our model, the change in population may influence the levels of social capital within a given community. Where endogeneity exists, significant correlation can exist between the unobserved factors contributing to both the endogenous independent variable and the dependent variable, which results in biased estimators (Avery, 2005). In our econometric estimation the percentage change in population between 1991 and 2001, $\%\Delta P$ as the dependent variable, was regressed on 1991 level data. That is, we pre-determined right hand side variables. For instance, it is not likely that the 1991 to 2001 population change *causes* 1991 social capital levels. Rappaport (2004), among others, has used initial economic conditions as driving migration decisions that occur over a subsequent period of time. Specifying subsequent population growth as a function of the initial period explanatory variables characteristic is an accepted way of dealing with statistical endogeneity (Partridge, et al., and 2006a). Thus in using this specification we are optimistic that the problems outlined above were mitigated.

Additionally, it is also useful to start with more parsimonious models than equation (4), in order to test whether the results are sensitive to subsequent addition of new variables. Partridge et al. (2006a) indicated that this approach help to assess if potential results are affected by potential multicolinearity and endogeneity. In so doing variables that were most likely causing unnecessary multicolinearity were omitted from the model. For instance, this problem was evident in most of the co-operative activity variables we proposed as indicators of social capital. Not surprisingly, different measures of co-operative activity were highly correlated. Thus, rather than using multiple measures simultaneously, one or two were selected.

However, as in any econometric estimation, we may face the problems of omitted variable bias. We are guided by the conceptual model that forms the framework for the analysis and data availability. Lastly, our data may be prone to some measurement error, emanating from the co-op activity variables or other variables we used. For instance, we used per capita membership as a proxy for the level of club/ social organization affiliation. Even though a 75 percent response rate on the co-operatives data collected through the Co-operatives' Secretariat voluntary annual co-operative survey is high, there could be some selectivity bias among respondents. Further, we have the issue of co-ops that have geographically dispersed members yet the total number of members is recorded at head office level. An example would be Mountain Equipment co-operatives; to the extent that we were able to discern these instances, we removed the data from the data set.

4.5.3 Summary of a priori *Expectations*

Table 4.1summarizes the expected direction of influence of the major variables that were adopted for the base model. The explanatory variable list shown here is the result of detailed preliminary analyses to select the best variables to represent each group of influences and to remove variables resulting in multicollinearity.

4.6 Chapter Summary

The methodology section has outlined the various resources that our research made use of in order to address the hypotheses that we put forward. F or instance the type of variables explored as well as how they were computed. Some econometric estimation problems have also been outlined and where possible the ways to mitigate those potential problems was discussed. We concluded the chapter by outlining the expected direction of influence of our results in light of prior theoretical and empirical evidence.

Table 4.1: Expected direction of Influence

Explanatory Variables	Expected Impact on Population growth
Dist_cma_100km	Negative
Incre_dist_250k	Negative
Incre_dist_500k	Negative
Nearest/own_cmapop_91	Positive
Pop_surr	Positive
Own_ccspop_91	Positive
Share_aborig	Positive
Share_unidegree	Positive
Employ_rate	Positive
Unemployment rate	Negative
Share_agric_employ	Negative
Share_prim_employ	Negative
Share_manu_employ	Ambiguous
%nonfarm_self_empl	Positive
July_rh	Negative
Jan_temp	Positive
Percapita_cinema	Positive
Percapita_outpatient	Positive
Percapita_ member	Positive
Percapita_mem_surr	Positive

CHAPTER 5: DISCUSSION OF RESULTS

5.0 Introduction

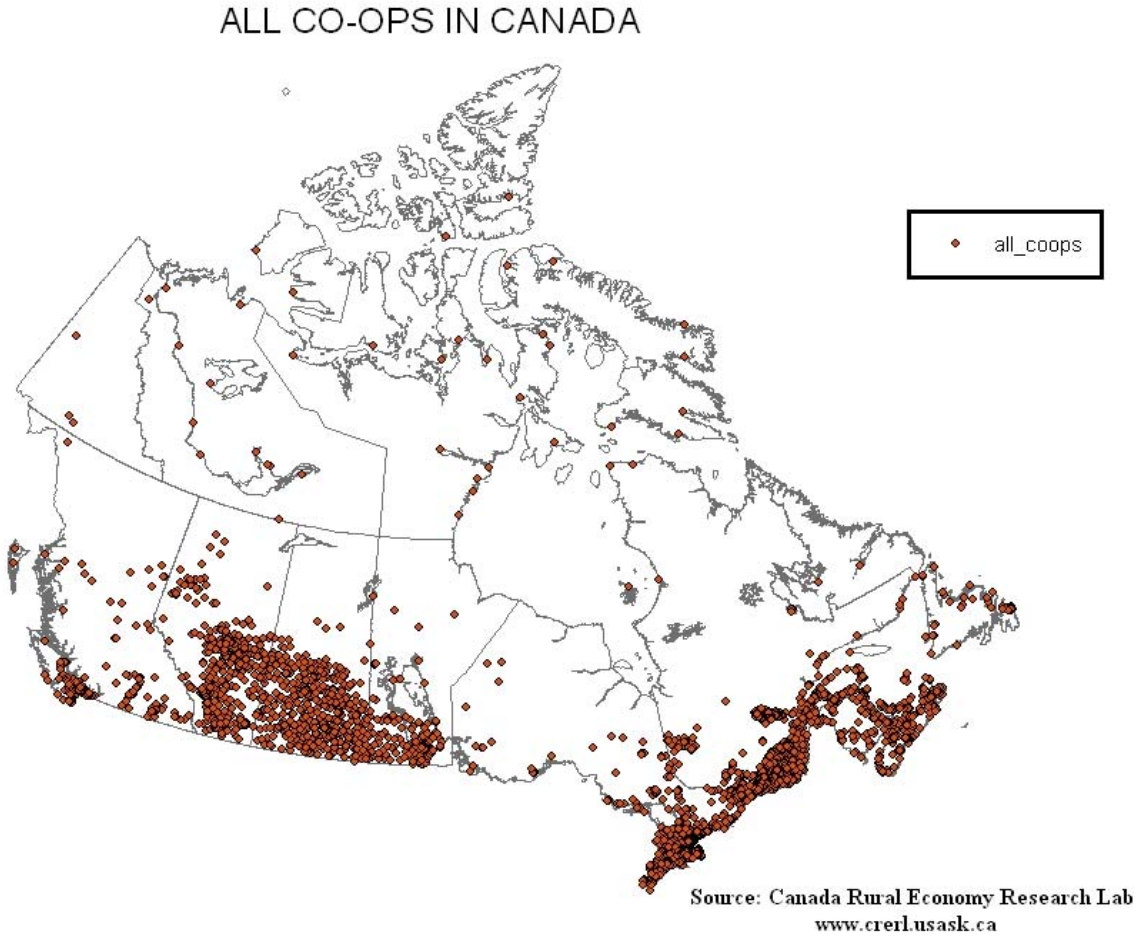
This section gives an overview of the results obtained for this study, beginning with a summary of the descriptive statistics. Following a stepwise process of adding groups of variables in the econometric estimation in a staged way, the base model is presented. We then explore various additional estimations. We divided the CCSs into regions in order to investigate the spatial differences in the determinants of population growth, including the role of co-ops. We conduct an analysis to test if various co-op types or industries yield any different results from the base model. In all these innovations, we are closely guided by the research objectives as well as the need to test for the validity of the hypotheses that we proposed in the first chapter of this thesis. Lastly, we discuss results of the sensitivity runs that test for endogeneity and lag structures and we conclude the chapter by summarizing the results.

5.1 Descriptive Statistics

Figure 5.1 shows the general distribution of co-operatives in Canada. Across Western Canada, the southern regions of Saskatchewan, Alberta and parts of Manitoba show the highest concentration, which we explain by the high incidence of co-ops specializing in agriculture marketing and input supply among other co-op activities. Retail co-ops in rural communities are also prominent in the prairie regions. In other parts of the country co-op distribution is concentrated along the borders of Ontario and Quebec. These regions are home to most of Canada's service co-ops such as housing, day care and health care co-ops. In this research we combine empirical analysis with GIS mapping in fulfillment of one of our objectives which is *to provide the visual depiction of incidence and impact of co-operatives*.

The descriptive statistics presented in Appendix Table 1 illustrate the means and standard deviations for the variables used in the 1991-2001 base model, as well as for those other estimations consisting of deep lags and the 1996-2001 population change model in the sensitivity analysis described in section 5.2.5. Statistics show that the average rural CCSs lost 0.9 percent of their population between 1991 and 2001, with a much steeper decline of about 2.4 percent between 1996 and 2001.

Figure 5.1: Distribution of Co-operatives in Canada



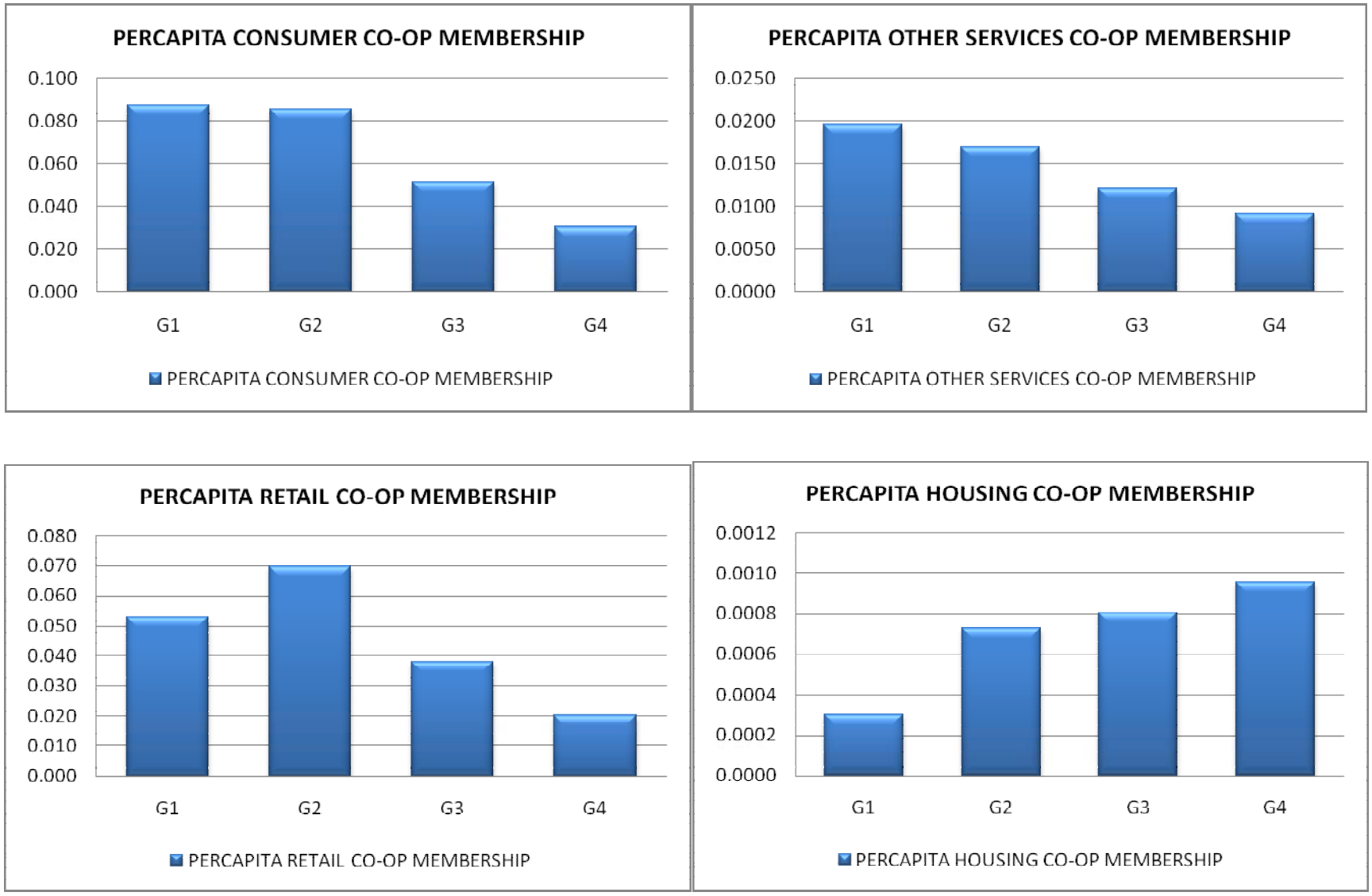
Over these two time frames, the average increase in urban CCSs was 11 and 3 percent respectively. It is evident that urban areas have a strong advantage over rural areas in most of the

variable groupings due the advantages of agglomeration. For instance, urban communities report an employment rate of 76 percent, whilst rural reported 56 percent.

The share of people with a university degree is also higher in urban areas compared to rural areas (5 and 11 percent respectively). Rural communities, have a higher share of aboriginal population as well as higher membership in co-operatives compared to urban CCS. Comparison of co-op membership presence per 1,000 people in the full sample shows that overall 10 percent of the population is affiliated with a co-op, while the corresponding rates are 11 and 6 percent for the rural and urban samples respectively. Only for the per capita housing co-op membership was the urban mean greater than the rural. These statistics are in line with other research that has found higher densities of co-ops in rural areas than in urban centers. Additionally the rural CCSs made the bulk of the sample size. After removing CCSs in the Northern Territories we had 2,601 CCSs while 2,086 were rural and 515 CCSs were in the urban areas.

A preliminary way of investigating the relationship between population change and co-operative membership is to examine the relationship between these two variables, without holding anything else constant. This was done by dividing data into four quartiles of population growth, with G1 (lowest growth CCSs) to G4 (highest growth CCSs). Plots were done for the data in respective CCSs. Figure 5.2 shows that for most of the co-ops, except the housing co-ops, per capita co-op membership is inversely related to own CCS population growth. While there is an apparent relationship, and different for different types of co-ops, this superficial representation is inadequate as no other variables are being controlled for. To truly reveal the contribution of co-operative activity to population change, controlling for all other influences, the econometric analysis must be conducted.

Figure 5.2: Growth in Per capita Co-op Membership over Population Growth Quartiles



5.2 Empirical Results

5.2.1 Base Model Regression Results

Tables 5.2a and b present the results from the empirical estimation of equation (4). We adopted a staged process of moving from a parsimonious model to the complete model, in order to test how responsive the results are to subsequent addition of new variables as well as assess if results are affected by potential multicollinearity. Moreover, we are mostly concerned with how, in addition to other underlying socio-economic and spatial attributes of a given community, the co-op variables (as indicative of social capital) impact on population change. This is the basis for testing our major research objective spelled out as: *To evaluate the impact of co-operatives on population change in the communities in which they are situated.* In all the models, we used provincial dummies to control for differences in socio-economic conditions across provinces.

Column 1 of Tables 5.2a and b shows the rural and urban regression results of the most parsimonious specification that expresses the percentage change in population from 1991 to 2001 as a function of only agglomeration factors. Agglomeration economies or access to the nearest urban centre have been shown to be of primary importance to population retention and growth (Partridge et al., 2005). For rural areas access to urban-based agglomeration economies through commuting to jobs or to access higher order goods and services is key. For these reasons, the agglomeration variables consist of a combination of population size and distance to urban centers of successively higher levels.

In column 1 of Table 5.2a, the negative and significant distance variables suggest that the farther away a rural CCS is from an urban centre, the lower is its population growth. For instance, initially, for a one kilometer increase in distance from the core of the nearest CMA (an urban centre of 100,000 people), population growth is reduced by about 0.022 percentage points.

Similarly, the distance penalty is evident for the incremental distance from the nearest CMA of 100,000 to the nearest CMA of 250,000 people, as well as the incremental distance to centers of greater than 500,000 people. The effect of distance from the own urban core, and from larger urban centers on population growth is also evident in the urban sample (column 1 of Table 5.2b). Only in the case of incremental distance from centers of greater than 500,000 is the distance variable not significant.

As regards the other key variables under the agglomeration grouping, the population of the nearest CMA has a positive and significant impact on rural population change, implying the influence that urban size has on nearby rural areas. We also found strong evidence in support of the influence of surrounding area conditions to the own CCS growth. That is, the population size of the CCS that shares a border with the focal CCS has a positive impact on CCS growth. Population size is one of our major variables since it is the basis for demand thresholds for different business sectors (Stabler et al., 1992). In this parsimonious specification, own CCS population size exerts a positive and significant influence on subsequent population growth of the rural CCSs. Yet, for the urban sample - column 1 of Table 5.2b, own CCS population is inversely related to population growth and the population of surrounding areas does not appear to be of importance in this specification. In an urban area, with its internal economic conditions driving its economic outcomes to a greater extent, the population size of surrounding CCSs would be expected to be less important. Overall, in the most parsimonious models, columns 1 of Tables 5.2a and b, agglomeration variables account for 21 and 23 percent of the explanatory power of the determinants of population growth respectively. With the exception of the population variables in the urban sample, all other agglomeration factors performed as expected.

In column 2 of Tables 5.2a and b we present the model estimation after adding the economic variables. These additions improve the R-squared by 0.1 points to 0.31. Although there was a slight reduction in the values of the agglomeration variable coefficients, they remained significant at the 1 per cent level, especially for the variables that define the distance to the nearest CMA of at least 100,000 populations (**dist_cma_100k)** and the population size of surrounding CCSs (**pop_surr).** The only exception is that the initial CCS population (**own_ccs_pop91)** lost significance for the rural CCSs, upon addition of economic variables. This change might suggest a degree of correlation between CCS initial period populations with certain CCS underlying economic conditions which have now been added. The own CCS initial period population size in the urban sample (column 2 of Table 5.2b) becomes statistically significant with the addition of the economic variables.

The results show that the share of people reporting an aboriginal identity (**share_aborig**) is positive and highly significant in determining population growth for both the rural and urban samples. These results are consistent with other research findings. For instance, Bollman (2006) suggest that the aboriginal populations are a source of population growth, especially for the rural areas. Education does not emerge as a strong predictor of population growth, as we hypothesized in previous chapters. In our analysis we chose the highest level of educational attainment, that is, the share of people with a university degree (**share_unidegree)** as a proxy for investment in human capital. We expect firms to be attracted to a high quality labor pool. This variable came out positive but was insignificant. A possible explanation is that the role of education is absorbed in some of the other variables such as the employment rate. Alternatively, it is possible that higher levels of education coincide with higher costs of labor which may offset the positive effects of higher human capital.

A number of employment measures such as the unemployment rate, employment rate, and the share of people employed in each of the agriculture, other primary and manufacturing industries as well as the share of people who are self employed were explored. With the exception of the unemployment rate, all the other variables showed some explanatory power and were thus adopted in the base model.

We find the influence of the employment rate (**employ_rate)** was as expected for both the rural and urban samples. Higher employment rates are strongly significant and positive factors for population growth. For instance, we find that for every one percentage increase in the employment rate, rural and urban populations grew by 0.25 and 0.34 percentage points respectively. In line with our theoretical model, the prospects of finding a job in the destination region are an important factor in the location decision of households. A very good example could be how households "vote with their feet" to the booming oil industry in Alberta.

The share of people employed in the agriculture sector (**share_agric-employ)** is inversely related to population growth. Long term and continuing labor saving technological change has resulted in less and less labor (and thus population) being required to produce a constant or even growing level of output in this sector. Even though Statistics Canada analysis showed that in 1991 agriculture employment accounted for only 3.7 percent of the total employment in all industrial sectors, the characteristic of the sector continue to affect population. By 1996 employment in the agriculture sector had decreased to 3.4 percent (Keith, 2003). Similarly, and also as expected, the share of people employed in the primary sector is also negative and significant for the rural sample, though insignificant in the urban sample (Column 2 of Table 5.2a and b respectively). All primary sectors are characterized to some degree by labor saving technologies as in the agriculture sector. Again, these results are consistent with the labor

shedding nature of primary production. The greater the reliance on primary production, the greater the dampening effects on population growth.

The influence of the share of people employed in the manufacturing industry (**share_man_employ_91)** is negative and significant for the rural sample. Routine manufacturing of the type that may be prevalent in rural areas has been affected by two important trends. One is increased mechanization and labor-saving technologies. The second is the decline in this sector as consumer demand has shifted to services. Further, routine manufacturing has re-located some operations to developing countries. The share of total employment that is non-farm self employment (**%nonfarm_self-employ)** is significant for the urban sample, implying the importance of entrepreneurship. Thus self-employment would seem to exert a positive influence in population change in urban CCSs. In the rural sample this variable is positive but not significant.

In the urban sample, the addition of the economic variables accounted for an additional 25 percent of the explanatory power of the model compared to just over 10 percentage points for the rural sample. Thus, underlying economic conditions of a given community, as identified here, are crucial for the population growth and retention of population in both rural and urban areas. In rural areas access to agglomeration economies as specified appear to dominate. For the rural sample (column 1 of Table 5.2a) agglomeration factors alone reported an R-squared value of 0.2134, and in column 2 **Econ** variables added only 10 percent points to the explanatory power.

Column 3 of Tables 5.2a and b reports the rural and urban regression results when amenity variables are added to the model respectively. Apart from slight modifications to agglomeration and economic variable coefficients, their signs and significance remains as

explained in previous paragraphs. The set of amenity variables adopted for this model do not contribute much to the explanatory power of the mode.

In addition to the two weather amenity variables included in the models here, a number of other representations of amenities were investigated for explanatory power. These included total January sunshine hours, average snowfall for the year, and average precipitation for the year, July midterm temperature, July relative humidity and January midterm temperatures. Only July relative humidity (**July_rh)** and January temperature (**Jan_temp**) offered any explanatory power. The climatic variables in our model suggest that in the rural areas, January temperatures are positively related to population growth and July relative humidity had the opposite effect. In the urban sample population growth is negatively affected by January temperatures. These findings are contrary to expectations. For instance, Ferguson et al. (2006) argues that the presence of natural amenities such as mountains and pleasant weather do not consistently drive population growth. As a possible explanation, Partridge et al. (forthcoming) argues that the lack of variability in Canada's weather renders unclear empirical results. Further, there might be a limited response to natural amenity variables since Canada's settlements are crowded along its more climatically and topographical hospitable borders.

A broad set of variables representing physical amenities were investigated for possible explanatory power. Variables for consideration were chosen to represent ways in which individuals in the community may interact and have a joint interest in community facilities. We considered the per capita numbers of police stations, acute care hospitals, cinemas, golf courses, long term acute care hospitals, outpatient clinics, educational institutions and tourism sites, as well as their respective distance measures. The only variables that offered any explanatory power were the outpatient clinics (**percapita_outpatient_clinic**) and cinemas (**percapita_cinema**) in a

given CCS. Worth mentioning, however, is that the per capita RCMP stations were significant and positively related to population growth. We did not adopt this variable in our base model because there are differences in the RCMP judiciary systems across provinces, especially in Ontario.

The per capita outpatient clinics are positive but not significantly related to population growth in the rural sample; signs inconsistent with expectation were obtained for the urban sample. However, we note that per capita number of cinemas in a CCS positively affects population growth in rural areas (Column 3 of Table 5.2a). Intuitively, this might suggest CCSs with cinemas will also have other amenities which may help make a community a possible destination source. Another possible explanation could be that the presence of cinemas may serve as focal points for social interaction thereby enhancing the quality of life of a community.

Lastly, column 4 reports on the regression results when the target co-operative activity variables are added to the rural (Table 5.2a) and urban (Table 5.2b) samples respectively. This completes the base model adopted for this study. The base models explains 32 and 48 percent of the variation in CCS population change between 1991-2001, which is only a slight change from those reported in the previous models. The contribution of the co-op variables in explaining variations in population change is thus fairly minor. We observe that the coefficients on all the variables maintained their signs and significance when the co-op variables are added, indicating that there is not a problem of co-linearity between the co-op variables and other explanatory variables.

With regard to the co-op activity variables, an extensive number of measures were attempted. We used co-op per capita measures of each of membership, assets, employment, consumer and wages variables, as well as their surrounding CCS measures, that is, per capita

membership from surrounding CCS. Distance measures such as the number of co-ops within 100km and 200km were also considered.

Table 5.1describes the variables that were not used in the base model and their outcomes in successive regressions. Out of the broad set of co-operative variables that we explored for possible explanatory power, only the per capita own CCS co-op membership (**percapita_mem**) and membership from the surrounding CCS (**percapita_mem_surr**) yielded meaningful results. Our choices of co-op variables, as indicators of social capital, were also informed by past research on the role of social capital (e.g. Flora 1998; Debertin and Goetz, 1997). For instance, in undertaking co-operative work or being a member of a social group, people make investments in their communities by getting to know or helping their neighbors. These investments result in the formation of "social capital." However, at the national level per capita co-op membership is insignificant in the rural and urban samples. Thus, given the relationships between the other explanatory variables and population change, no statistically significant marginal contribution of variations in co-op membership to the explanation of population change was found.

Table 5.1: Alternative Co-operative Activity Variables

Variable	Description	Direction of Influence in Regression
CO-OP_100KM	Count of number of co-ops within 100km	not significant
CO-OP_200KM	Count of Co-operative with 200km of a given CCS	positive, significant
PER_ASSETS	Per capita co-op assets per 1,000 people	not significant
PER_COOP_EMPL	People employed by a c-operatives per 1,000 population	not significant
PER_CONS_SALES	Density of co-operatives consumer sales per 1,000	not significant
PER_WAGES	Wages of co-operative members per 1,000 people	not significant

Source: The data was obtained from the Co-operatives Secretariat 1992 Annual mail survey f co-operatives

The membership in surrounding areas is positive and insignificant in the urban sample, but significant and negative in the rural sample. Contrary to our expectations co-op membership per 1,000 people in given CCS is not a significant determinant of community population growth. In chapter 1 we hypothesized that community *with a higher level of co-operative activity grower faster than communities with lower levels.* Our hypothesis is considered under the premise that co-operative activities are an indication of social capital, thus we expect the presence of co-operatives in a community to positively influence community growth. However, our findings are limited to the influence of co-operative activity and do not apply generally to social capital.

In seeking possible explanations for our results, other recent studies were reviewed. Potentially, part of these results may be explained by the fact that in the 1990s co-operatives, especially agriculture co-ops in Western Canada and Quebec were consolidating their activities. This restructuring came with the subsequent decline in membership. As Ketilson (1990) elaborates, mergers shift decision making from local to central bodies, thereby weakening membership control. If the membership loses influence and control, their ability to build social capital will also be compromised, and thus their role in improving the quality of life in the community. Other researchers, e.g. Fulton (1999) elaborate this phenomenon by pointing to the breakdown of membership commitments as co-operatives adapt to evolving market conditions.

Yet another source of the divergence could emanate from the quality and nature of the data. The co-operative data was taken from the 1992 annual mail survey of co-operatives in Canada, and this is a voluntary process, which in some cases co-ops are omitted. Although there is a 75 per cent response, which is a very good sample size for our analysis, we can not completely rule out the likelihood of understating the importance of co-operatives due to data selectivity. Lastly, we made use of a set of dummy variables (**Prov_dummy**) as one way of

Table 5.2a: All Co-ops, Rural 91-01 % Δ in Population, Parsimonious Regression Models[a,b]

	Rural			
Variables[c]	**Agglomeration (1)**	**Add Econ (2)**	**Add Amenities (3)**	**Base Model (4)**
Dist_cma_100k	-0.00022	-0.00021	-0.0002	-0.0002
	(-2.92)***	(-4.29)***	(-4.11)***	(-4.01)***
Incre_dist_250k	-0.00009	-0.00008	-0.00008	-0.00007
	(-1.64)	(-1.71)*	(-1.76)*	(-1.66)*
Incre_dist_500k	-0.00029	-0.00022	-0.00023	-0.00023
	(-2.76)***	(-2.73)***	(-2.79)***	(-2.85)***
Nearest/own_cmapop_91	2.84E-08	1.54E-08	1.65E-08	1.64E-08
	(3.23)***	(2.04)**	(2.18)**	(2.18)**
Pop_surr	3.55E-07	2.75E-07	2.80E-07	2.80E-07
	(4.48)***	(3.75)***	(3.90)***	(3.93)***
Own_ccspop_1991	4.32E-06	7.70E-07	5.36E-07	5.44E-07
	(3.67)***	(0.7)	(0.5)	(0.51)
Share_aborig		0.16587	0.16339	0.15736
		(1.82)*	(1.75)*	(1.68)*
Share_unidegree		0.11684	0.1067	0.09429
		(0.62)	(0.56)	(0.5)
Employ_rate		0.25352	0.25462	0.25442
		(6.08)***	(5.80)***	(5.70)***
Share_agric_employ		-0.41405	-0.41383	-0.41137
		(-7.57)***	(-7.45)***	(-7.32)***
Share_prim_employ		-0.53528	-0.52754	-0.52944
		(-5.00)***	(-4.93)***	(-4.89)***
Share_manu_employ		-0.2574	-0.26793	-0.26696
		(-3.58)***	(-3.52)***	(-3.50)***
%nonfarm_self_employ		0.06711	0.06374	0.06685
		(0.74)	(0.69)	(0.73)
July_rh			-0.00004	-0.00003
			(-0.11)	(-0.09)
Jan_temp			0.0026	0.00262
			(2.51)**	(2.61)**
Percapita_cinema			332.12	334.43
			(1.98)*	(1.95)*
Percapita_outpatient_clinics			9.21	10.40
			(0.54)	(0.63)
Per_member				-0.00879
				(-1.02)
Per_mem_surr				-0.03992
				(-2.04)**
Prov_dummy	yes	yes	yes	yes
Observations	2002	1995	1995	1995
R-squared	0.2134	0.3101	0.3148	0.3163

[a] Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above ; [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. *, ** and *** denote significance at 10%, 5% and 1% respectively; [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence; [d]Yes denote that provincial dummies are included in the model. Constant term included in the model but not shown.

Table 5.2b: All Co-ops, Urban 91-01 % Δ in Population, Parsimonious Regression Models[a,b]

	Urban			
Variables[c]	**Agglomeration (1)**	**Add Econ (2)**	**Add Amenities (3)**	**Base Mode (4)**
Dist_cma_100k	-0.00035	-0.00028	-0.00028	-0.00029
	(-4.55)***	(-4.33)***	(-4.39)***	(-4.32)***
Incre_dist_250k	-0.00014	-0.00011	-0.0001	-0.00011
	(-2.21)**	(-2.40)**	(-2.24)**	(-2.29)**
Incre_dist_500k	-0.00004	0.0001	0.00009	0.00009
	(-0.25)	(0.58)	(0.57)	(0.58)
Nearest/own_cmapop_91	3.21E-08	1.48E-08	1.51E-08	1.52E-08
	(3.80)***	(2.21)**	(2.33)**	(2.35)**
Pop_surr	1.12E-08	-8.79E-09	-8.71E-09	-9.46E-09
	(0.63)	(-0.86)	(-0.78)	(-0.84)
Own_ccspop_1991	-1.58E-07	-7.28E-08	-7.58E-08	-8.02E-08
	(-3.62)***	(-1.48)	(-1.52)	(-1.61)
Share_aborig		0.31748	0.32337	0.32286
		(1.91)*	(2.05)**	(2.05)**
Share_unidegree		-0.0789	-0.06849	-0.07118
		(-0.51)	(-0.43)	(-0.46)
Employ_rate		0.34365	0.34293	0.3441
		(3.94)***	(3.89)***	(3.93)***
Share_agric_employ		-0.41551	-0.43221	-0.4468
		(-2.06)**	(-2.15)**	(-2.21)**
Share_prim_employ		0.21658	0.21077	0.21609
		(0.83)	(0.82)	(0.83)
Share_manu_employ		0.09961	0.10972	0.09266
		(0.44)	(0.48)	(0.4)
%nonfarm_self_employ		0.46383	0.5183	0.5148
		(1.93)*	(2.14)**	(2.11)**
July_rh			0.00094	0.00093
			(2.01)**	(1.98)*
Jan_temp			-0.00211	-0.0021
			(-2.00)**	(-1.97)*
Percapita_cinema			41.05	34.69
			(1.05)	(0.9)
Percapita_outpatient_clinics			-148.24	-133.53
			(-0.86)	(-0.76)
Per_member				-0.01513
				(-0.48)
Per_mem_surr				0.03688
				(0.92)
Prov_dummy[d]	Yes	Yes	Yes	Yes
Observations	512	512	510	510
R-squared	0.2254	0.472	0.4776	0.4786

[a] Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above ; [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. *, ** and *** denote significance at 10%, 5% and 1% respectively; [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence; [d]Yes denote that provincial dummies are included in the model. Constant term included in the model but not shown.

examining differences in the determinants of population growth within the country. The results (not reported in the tables for the sake of brevity) showed that in the rural model, with the exception of PEI, relative to BC, the Prairie Provinces, Quebec, Ontario, Newfoundland, and New Brunswick and Nova Scotia lost population between the periods 1991-2001. For the urban sample we found that all provinces lost population between 199-2001 relative to BC.

In sum, from the base model results we found no clear indication that at national level, co-op activity, impacts community growth and vitality, once all other sources of population growth are accounted for. As noted earlier, there is a great deal of variation in the incidence and type of co-op in the sample by regions. It is possible that the insignificant findings for co-op activity reported above are the result of offsetting negative and positive effects across regions or by co-op types. To investigate this possibility, the following sections present the model estimates by regions, by co-op types, and by industry category.

5.2.2 Regional Analysis

5.2.2.1 Chow Test

Another of our major objectives was to provide an understanding of how, in addition to the socio-economic conditions of a given community/regions, the impact of co-operatives varies spatially. It is possible that the broader economic regions in the country represent fundamentally different settings for economic growth and thus, perhaps the role of co-ops. Different regional patterns may be offsetting leading to insignificant results at the national level. In this regard we divide the data into five regions: British Columbia, hereafter referred to as **BC**; Saskatchewan, Manitoba and Alberta (**Prairies),** Newfoundland and Labrador, Prince Edward Island and New Brunswick (**Atlantic Canada),** and Central Canada will be divide into two distinct regions, **Quebec** and **Ontario.** To test the validity of distinguishing these 5 regions as being significantly

different, we conducted a Chow test. In general the Chow test is an F test used to determine whether regional groupings are statistically different from the full sample. In our implementation of the test, we estimate the restricted model by doing a pooled regression. This is a model with the full sample, that is, Y is a set of outcomes ($Y_1 \ldots Y_n$) and each of the coefficients represent a unique value of the single unrestricted full model as illustrated by equation 6 below.

$$Y= a+bX+cX+\ldots..+ u \quad (6)$$

The sum of squared residuals obtained from estimating equation 6 above gives the SSR_r. We then run regressions for each of the equations 7 to 11,

$$Y= a_1+b_1X_1+c_1X_2+\ldots..+ u \quad \text{for the Prairies (model 1)} \quad (7)$$

$$Y= a_2+b_2X_1+c_2X_2+\ldots..+ u \text{ for BC (model 2)} \quad (8)$$

$$Y= a_3+b_3X_1+c_3X_2+\ldots..+ u \quad \text{for Atlantic Canada (model 3)} \quad (9)$$

$$Y= a_4+b_4X_1+c_4X_2+\ldots..+ u \text{ for Quebec (model 4)} \quad (10)$$

$$Y= a_5+b_5X_1+c_5X_2+\ldots..+ u \text{ for Ontario (model 5)} \quad (11)$$

and obtained the respective sum of squared residuals for each model. The unrestricted sum of squares residuals is obtained as $SSR_{ur}=SSR_1 +SSR_2 +SSR_3 +SSR_4 +SSr_5$, with $(n_1+n_2+\ldots.n_5-k)$ degrees of freedom. To illustrate this test we assume our null hypothesis is expressed as illustrated in equation 12.

$$H_0: \ b1=b2\ldots\ldots..=b5=0 \quad (12)$$

The respective Chow/F statistic is presented in equation 13 below.

$$F = ((SSR_r-SSR_{ur})/k+1) / (SSR_{ur})/ (n-2k)) \quad (13)$$

Where n= number of observations ($n =n_1+ n_2+ n_3+ n_4 +n_5$) from each of the five models, k is the number of estimated parameters, which is equal to 20 from our full sample. The Chow Statistic follows the F distribution with k, (n-2k) degrees of freedom. Our decision rule states

that if the computed F exceeds F_α (k, n-2k) at the α level of significance, we reject the null hypothesis, if otherwise we fail to reject it. For the rural sample F_α (k, n-2k) = (20, 1995) and the urban sample computed F static is (20, 470). Since we had the same parameters for both samples and that our degrees of freedom for the denominator exceeds 200 in both samples, the statistical tables for the F distribution show the same value for our critical F statistics, F critical=1.88 at the 1% critical value[11]. Our results generated an F static of 15.37 and 9.6 for the rural and urban samples respectively. Since F> F_α (k, n-2k), for both the rural and urban samples, we reject the null hypothesis and conclude that the regional groupings are significantly different from the all Canada sample at all critical levels of the F statistic. Having rejected the null hypothesis the following section outlines the results obtained from the regional analysis.

5.2.2.2 Regression Results by Regions

The rural and urban results of the regional regression are shown as columns 1-5 of Tables 5.3a and b respectively. Generally, the effect of distance to the nearest urban centre remains negative and significant across the rural regions (column 1 of Table 5.3a), but the distance penalty is bigger for the prairie region. In Ontario this variable is not significant.

In both the Prairies region and in Quebec, CMA population size exerts positive and significant impact. While own CCS population in 1991 has a positive impact in the Prairie region, it has a negative and significant impact in rural CCSs in Quebec. For other regions, other than distance to the nearest CMA, other agglomeration variables were insignificant.

The contribution of aboriginal population is strong and positively related to population growth in rural Prairies, Atlantic Canada and Quebec. In Ontario however, this variable is significant and negative. In BC this variable is insignificant. We observed that the level of

[11] Critical values for the F statistic were obtained from Statistical tables in Gujarati, 2004. We reported our critical F value at the 1% critical level. The Corresponding 5% and 10% critical values are 1.57 and 1.42 respectively.

human capital is a strong determinant of population growth only in rural areas in Atlantic Canada (column 3 of Table 5a). The employment rate is positive and significantly related to rural population growth in all regions except in Ontario (column 5 of Table 5.3a). The negative impact of the agricultural sector dependence on rural population is evident in the prairie region, Quebec and Ontario but is insignificant in Atlantic Canada and BC. The share of population employed in manufacturing results are similar to the base model results, expect for the prairies and BC. Dependence on the primary sector employment has similar effects for all regions compared with the all Canada results.

Compared with the base model, all regional regressions explained a greater variation in population growth. The only exception was the rural Ontario sample, with an R-squared value of 0.31. The Quebec rural model, with the bulk of the rural CCS (871 of 1995), explained only 34 percent of the variation in population change between 1991 and 2001. The Prairie Provinces had the second highest sample size (449) after Quebec and explained about 48 percent of the variation in population change. Atlantic Canada reported an R-squared value of 0.56 and had a sample size of 289. British Columbia had the least number of CCSs, and the model reported the highest R-squared value, that is, the model explained about 71 percent of the variation in population change between 1991 and 2001. At large, the all Canada sample results are relatively influenced by the relationship in the Prairie region and Quebec regions given the large number of observations in these regions.

The urban sample results presented in columns 1-5 of Table 5.3b show that most results are different from those of the base model for all Canada (Table 5.2b). A strong negative influence of distance is evident in Ontario and Atlantic Canada. A positive influence of size of nearest or own urban centre is apparent only in Ontario and BC, whilst the impact of initial

period population is only evident in BC. The aboriginal population share is positively related to population growth only in Quebec and the Prairies. The share of population with a university degree is negative in BC and Quebec, which is unexpected. The positive impact of the employment rate is upheld in all regions except Atlantic Canada. The share of agricultural employment is not a significant factor in urban growth. Differences in the recovery to the 1980s recession could be one way of explaining our findings. For instance whilst the central regions grew, western provinces faced challenges of a declining agricultural and natural resources sector. Consistent with Partridge and Rickman (forthcoming), the Canadian labor markets are heterogeneous across regions. Amenity variables, natural and physical, are largely insignificant except for January temperatures in the Prairie regions.

With regards to the co-operative variables, first we present Figures 5.2 to 5.5 help readers to get an appreciation of the distribution of co-operative membership in Western Canada, Atlantic Canada, Quebec and Ontario respectively. There are profound variations in the spatial distribution of members across Canada. The color code shows that the light grey -no members to dark red as the most member populated areas. Western Canada (Figure 5.3) and Quebec (figure 5.6) show evidence of more co-op members as compared to other part of Canada.

Our econometric results show that in the Prairies, per capita co-op membership is a positive though not a significant determinant of community population growth for both the rural and urban samples. The same applies to the urban co-op membership in the surrounding areas for the prairies. Surrounding community co-op membership is however negative and significant in the rural prairie communities, as well as in Atlantic Canada. Quebec shows some evidence of a *positive impact* of co-op activity. In a typical urban Quebec community, higher co-op

membership has a positive and significant impact on population growth. The surrounding co-op membership is also a positive influence on population growth for rural BC communities.

Figure 5.3: Distribution of Per Capita Co-operative Membership in Western Canada

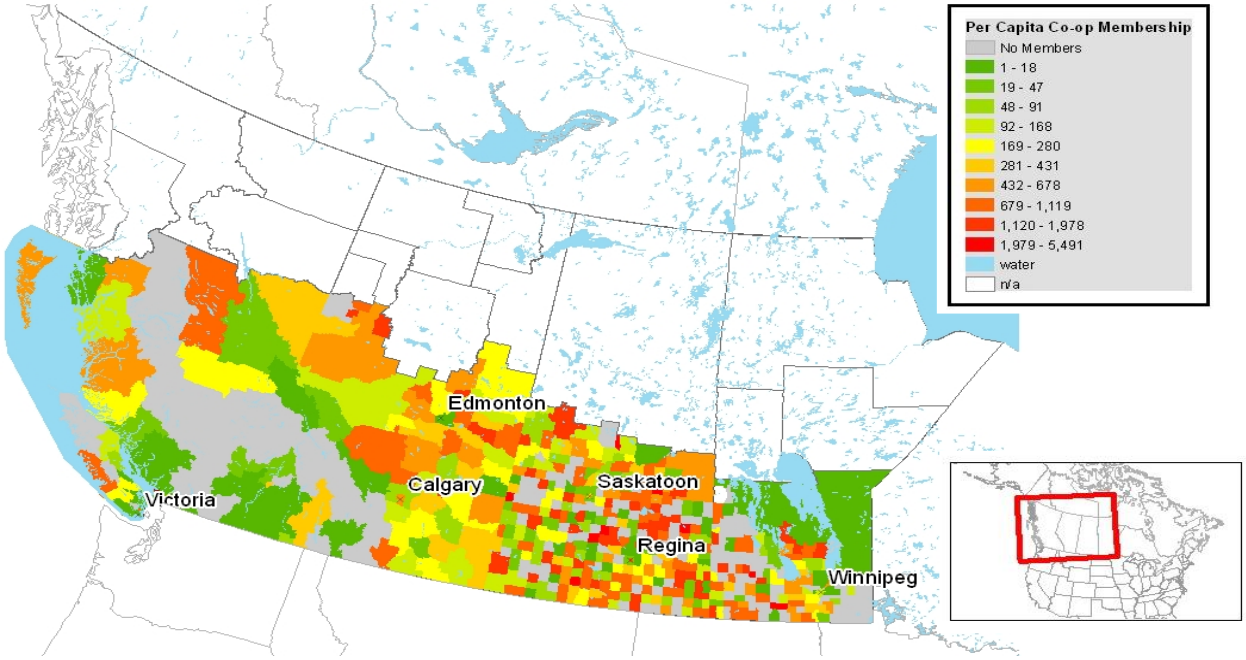


Figure 5.4: Distribution of Per Capita Co-operative Membership in Atlantic Canada

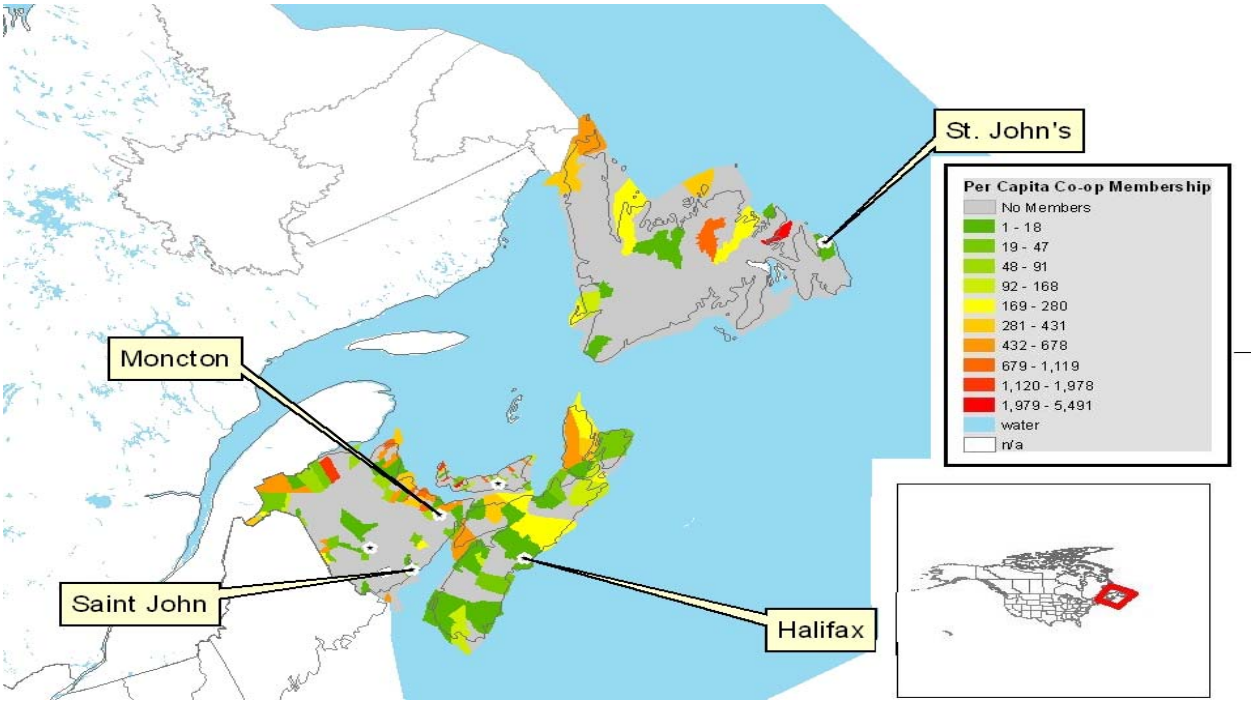


Figure 5.5: Distribution of Per Capita Co-operative Membership in Central Canada: Quebec

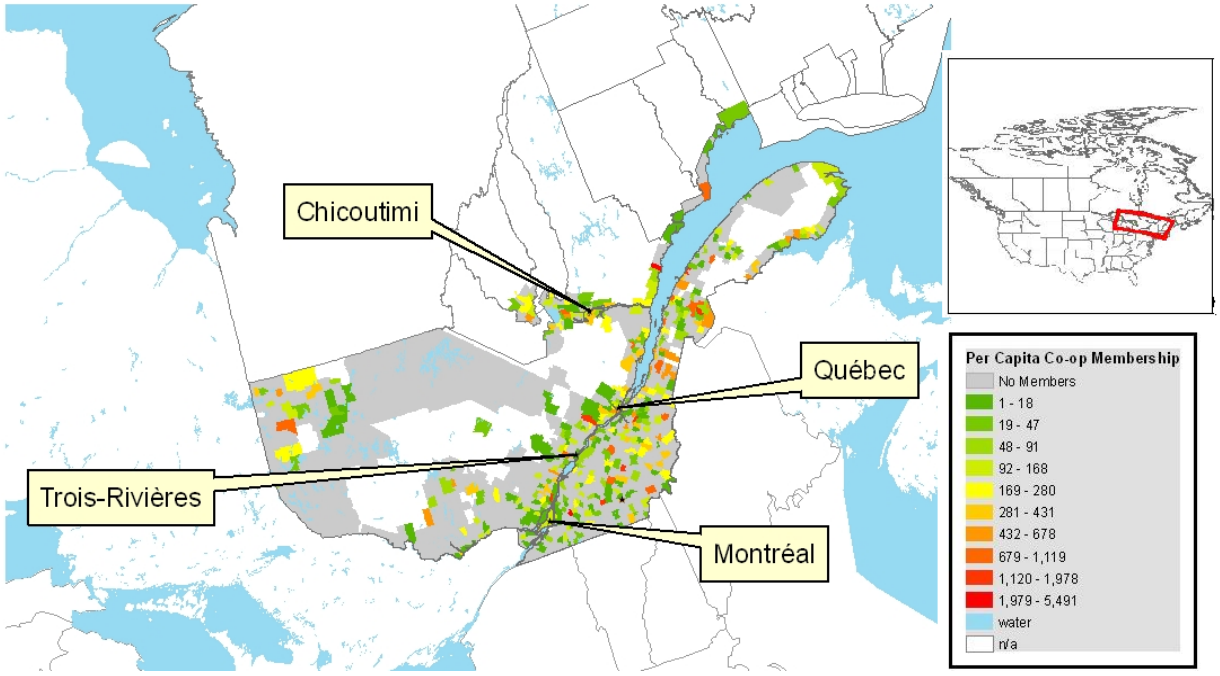


Figure 5.6: Distribution of Per Capita Co-operative Membership in Central Canada: Ontario

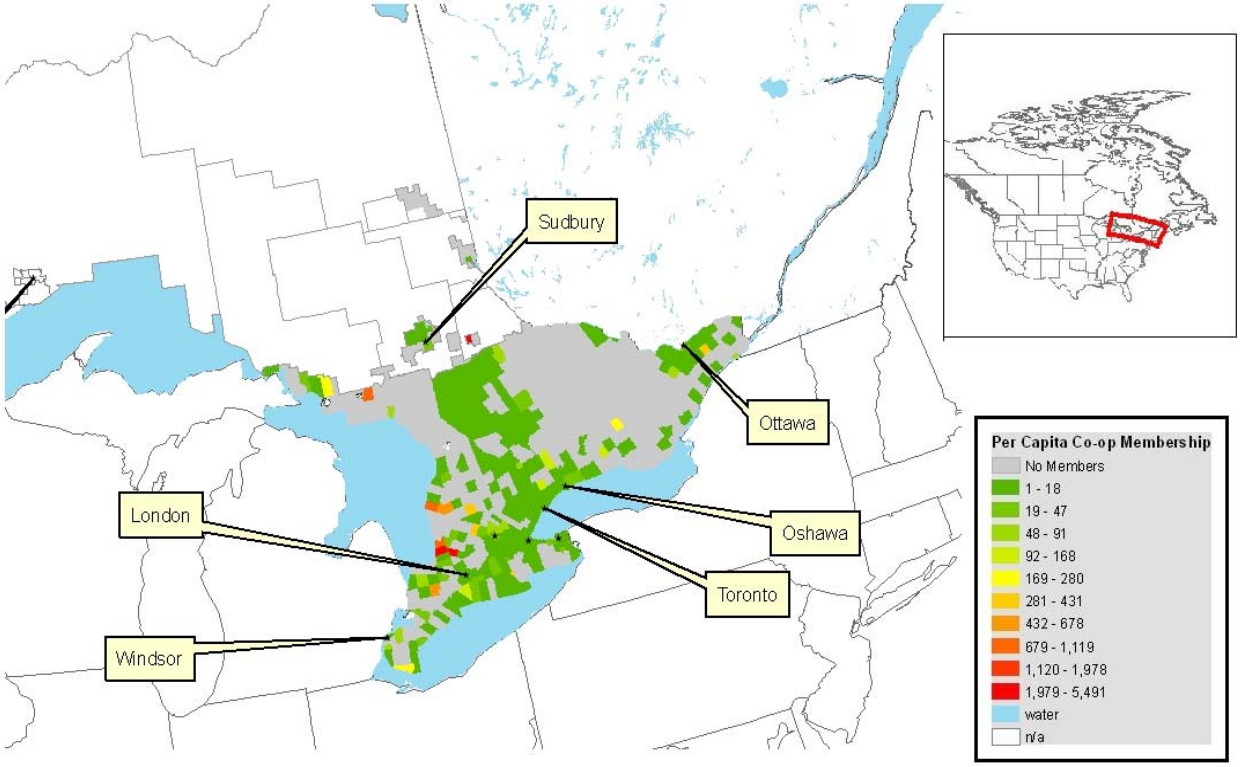


Table 5.3a: All Co-ops, Rural 91-01 %Δ in Population, Regression Results by Region[a,b]

	RURAL				
Variables[c]	**PRAIRIES**	**BC**	**ATLANTIC**	**QUEBEC**	**ONTARIO**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Dist_cma_100k	-0.0003	-0.0005	-0.0000	-0.0002	-0.00012
	(-5.02)***	(-3.10)***	(-0.11)	(-4.06)***	(-0.39)
Incre_dist_250k	-0.0001	-0.0001	0.0001	0.0002	-0.0004
	(-1.35)	(-0.36)	(1.11)	(1.73)*	(-1.52)
Incre_dist_500k	n/a[d]	-0.0007	-0.0001	-0.0003	-0.0005
		(-0.43)	(-0.57)	(-1.30)	(-1.16)
Nearest/own_cmapop_91	1.10E-07	-1.41E-08	2.282E-08	2.18E-08	1.49E-08
	(2.73)**	(-0.26)	(0.83)	(2.44)**	(1.30)
Pop_surr	3.95E-07	1.76E-07	9.14E-08	4.53E-07	1.73E-07
	(6.82)***	(1.41)	(0.55)	(1.51)	(0.76)
Own_ccspop_1991	4.22E-07	3.96E-06	1.04E-06	-5.36E.06	-2.098E-06
	(2.50)**	(1.23)	(0.76)	(-2.18)**	(-0.93)
Share_aborig	0.3124	0.3633	0.2794	0.3565	-0.7846
	(6.19)***	(1.35)	(3.07)***	(6.81)***	(-1.84)*
Share_unidegree	-0.4699	-0.2350	0.3897	0.3556	-0.3064
	(-1.08)	(-0.31)	(2.06)*	(1.23)	(-0.94)
Employ_rate	0.2409	0.6310	0.2025	0.3062	0.0615
	(2.39)**	(2.25)**	(2.69)**	(6.85)***	(0.52)
Share_agric_employ	-0.2853	-0.0734	-0.2128	-0.5061	-0.4578
	(-3.39)***	(-0.12)	(-1.43)	(-5.39)***	(-2.95)***
Share_prim_employ	-0.4488	-1.3602	-0.3495	-0.4219	-1.0709
	(-1.91)*	(-2.65)**	(-4.13)***	(-1.89)*	(-1.58)
Share_manu_employ	0.3515	-0.7218	-0.3482	-0.1687	-0.8137
	(1.08)	(-0.83)	(-4.04)***	(-1.89)*	(-1.80)*
%nonfarm_self_employ	0.1288	-0.0115	0.1228	0.0425	-0.3239
	(0.80)	(-0.02)	(0.95)	(0.45)	(-0.82)
July_rh	0.0011	0.0001	-0.0005	-0.0012	-0.0010
	(2.66)**	(0.04)	(-0.69)	(-1.72)*	(-1.11)
Jan_temp	0.0020	0.0023	0.0019	0.0025	0.0044
	(1.37)	(0.51)	(0.29)	(1.19)	(1.34)
Percapita_cinema	351.8	571.4	-505.6	n/a	258.6
	(1.98)*	(1.58)	(-1.71)		(0.35)
Percapita_outpatient	15.5	829.2	-7.3	25.6	252.3
	(0.88)	(1.17)	(-0.22)	(1.32)	(1.82)*
Percapita_member	0.0071	0.0988	-0.0186	-0.0530	0.0380
	(0.75)	(0.75)	(-2.45)**	(-2.40)**	(1.20)
Percapita_mem_surr	-0.0520	0.8578	-0.0483	-0.0013	0.1749
	(-1.81)*	(1.91)*	(-1.96)*	(-0.04)	(1.29)
Prov_dummy[e]	Yes		Yes		
Observations	449	43	289	871	343
R-squared	0.4807	0.7067	0.5641	0.3349	0.1746

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b] Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. * , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d]n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e]Yes denotes that provincial dummies are included in the model. Constant term included in the model but not shown.

Table 5.3b: All Co-ops, Urban 91-01 %Δ in Population, Regression Results by Region[a,b]

	URBAN				
Variables[c]	**PRAIRIES**	**BC**	**ATLANTIC**	**QUEBEC**	**ONTARIO**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Dist_cma_100k	0.00011	-0.0001	-0.0012	-0.0002	-0.0005
	(0.39)	(-1.21)	(2-.87)**	(-1.07)	(-3.02)***
Incre_dist_250k	0.0003	0.0002	-0.0003	0.0001	-0.0001
	(1.30)	(0.80)	(-1.42)	(0.54)	(-2.13)**
Incre_dist_500k	n/a	-0.0005	-0.0005	n/a	0.0002
		(-1.68)	(-3.24)***		(0.84)
Nearest/own_cmapop_91	-1.53E-06	3.49E-08	2.22E-07	3.35-09	2.23E-08
	(-1.78)*	(1.94)*	(1.48)	(0.41)	(3.47)***
Pop_surr	-9.9E-09	-3.00E-08	1.32E-07	-4.02-09	-2.51E-08
	(-0.14)	(-1.22)	(-0.31)	(-0.31)	(-0.94)
Own_ccspop_1991	-6.43-08	3.23E-07	-7.36E-07	-9.52E-07	-6.87E-08
	(-0.35)	(3.21)***	(-1.64)	(-0.26)	(-0.93)
Share_aborig	0.2377	0.0447	-0.3829	0.9199	0.2881
	(1.76)*	(-0.23)	(-0.47)	(7.15)***	(-1.12)
Share_unidegree	0.3981	-1.3355	0.0997	-0.4996	0.0263
	(0.69)	(-3.00)***	(0.26)	(-3.39)***	(0.19)
Employ_rate	0.6730	0.5167	0.1059	0.5873	0.3307
	(4.55)***	(4.83)***	(1.04)	(10.47)***	(5.87)***
Share_agric_employ	-0.0350	-0.8130	-0.4124	-0.1609	-0.2942
	(-0.11)	(-1.31)	(-0.94)	(-0.62)	(-1.38)
Share_prim_employ	-0.2165	-0.6593	0.0932	0.3272	-0.0977
	(-0.71)	(-0.97)	(0.19)	(0.49)	(-0.36)
Share_manu_employ	0.7223	-0.3872	-1.1822	0.0669	0.0956
	(0.62)	(-1.62)	(-2.22)**	(0.27)	(0.32)
%nonfarm_self_employ	0.1795	2.5711	0.7405	0.4745	0.4767
	(0.41)	(1.58)	(0.60)	(0.99)	(1.39)
July_rh	0.0051	-0.0004	-0.0028	-0.0007	0.0007
	(4.48)***	(-0.22)	(-0.94)	(-0.42)	(1.21)
Jan_temp	-0.0001	0.0023	-0.0054	-0.0006	-0.0033
	(-0.07)	(1.31)	(-0.44)	(-0.21)	(-1.35)
Percapita_cinema	-10.4	-530.1	-359.7	95.6	572.8
	(-0.11)	(-0.87)	(-0.82)	(0.12)	(1.75)*
Percapita_outpatient	182.3	946.8	-64.3	-828.9	603.8
	(0.79)	(0.68)	(-0.27)	(-2.84)***	(1.13)
Percapita_member	0.0281	-0.1938	-0.0834	0.0945	-0.3203
	(0.43)	(-1.58)	(-0.44)	(1.96)*	(-2.39)**
Percapita_mem_surr	0.0302	-0.3785	0.1632	0.0214	-0.4518
	(0.24)	(-1.32)	(0.72)	(0.42)	(-0.89)
Prov_dummy[e]	Yes		Yes		
Observations	49	39	63	190	169
R-squared	0.7986	0.8017	0.666	0.5069	0.6545

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b] Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. * , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d]n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e]Yes denotes that provincial dummies are included in the model. Constant included in the model but not shown.

The previous discussion has shown the importance of agglomeration and social-economic factors in the growth and vitality of rural and urban communities, but apart from the positive impact of co-op membership in urban communities in Quebec, as well as co-ops in surrounding rural communities in BC, there is little evidence marginal contribution of co-op activity to population growth. We further assess if there are any factors that we might not have captured in our national and regional level analyses by differentiating co-operatives by type and by industry.

5.2.3 Regression Results by Co-op Type

Our data on co-ops allowed us to divide the data into co-operatives that were consumer, producer, worker, multi-stakeholder, and federation and wholesale co-operatives. Table 5.4 gives a summary of the number of co-operatives and total membership in each category. Since the latter three marked * had very low numbers, they were combined into a single category that we will refer to as 'other' co-ops. The rows denote co-op types, while the columns show their industry categories. The divisions and the definitions of co-ops into co-op type and industry types and taken from the Co-operatives Secretariat database, and as such may not mean the commonly used terms in the co-ops world. For instance, multi-stakeholder in the context of this research means co-ops whose membership includes different categories of members.

Consumer co-ops make up the bulk of the co-operatives in our data sets, 2,863 of the 3,633 total co-ops in the study. Consumer co-ops are basically owned by their customers. They provide services to households such as retail services, health care, and housing among others. Membership in consumer co-ops also constitutes more than half of the total members in all co-ops in Canada (1,961,189 of 2,334,919). Producer co-ops (615) are owned mostly by farmers who band together to process and/or to market their products. Producer co-ops may also provide supplies or services for their members.

Table 5.4: Number of Co-operatives under each category

	Agriculture Co-ops	Retail Co-ops	Housing Co-ops	Other Service Co-ops	TOTAL
CONSUMER					
Number of Co-ops	49	393	1,633	788	**2,863**
Total Membership	23,650	1,618,880	89,722	228,937	**1,916,189**
PRODUCER					
Number of Co-ops	225	8	-	382	**616**
Total Membership	261,115	12,762	-	70,957	**344,852**
WORKER					
Number of Co-ops	14	6	-	86	**106**
Total Membership	450	518	-	4,897	**5,865**
FEDERATED *					
Number of Co-ops	1	3	16	22	**42**
Total Membership	1,514	309	1,615	16,696	**20,134**
MULTI-STAKEHOLDER *					
Number of Co-ops	-	1	-	2	**3**
Total Membership	-	1,295	-	1,017	**2,312**
WHOLESALE *					
Number of Co-ops	1	3	-	-	**4**
Total Membership	10	557	-	-	**567**
TOTAL					
Number of Co-ops	**290**	**414**	**1,649**	**1,280**	**3,633**
Total Membership	**286,739**	**1,634,321**	**91,337**	**322,522**	**2,334,919**

Source: Co-operative Secretariat 1992 annual mail survey of co-operatives.

Worker co-ops are owned by employee members as jointly owned enterprises. Worker co-ops may be found in all economic sectors, but at 106 they are less common than other types of co-ops. In Canada, they are most prevalent in the forestry industry. The last category comprised of the combined wholesale (4), federation (42) and multi-stakeholder co-ops (3) are basically co-ops whose membership includes different categories of members who share a common interest in the organization. That is, a variety of stakeholders unite their efforts to provide quality service and to meet a community need. For instance, wholesale co-ops develop to give their local co-ops the benefit of mass buying. A major distinguishing feature of these co-ops in the 'other' type is that the members are composed of other co-ops. In undertaking our analysis by co-op type, we included the consumer, producer, worker and 'other' co-op membership variables in successive analyses.

Tables 5.5a and b present results from the analysis by co-op type. Generally the significance levels and the direction of influence of agglomeration, economic and amenity factors are similar to the base model results. The explanatory power of both the rural and urban models by co-op type is not however significantly different from the base model presented above with the R-squared values ranging from 0.32 to 0.48. For instance the rural consumer co-ops model explained about 32 percent of the variation in the 1991-2001 population change whilst the corresponding urban model had an explanatory power of 48 percent.

In both rural and urban samples we find membership in worker and producer co-ops is not related to population growth. Again there are no neighborhood effects accruing from co-ops in the surrounding CCS. The worker co-ops may be expected to have a different effect than the rest of the other co-ops types due primarily to the fact that they are concentrated in labor-intensive sectors such as the forestry industry, and the major problem they face is lack of financial capital for their businesses (Quarter, 1990). It is possible that the small size of these co-ops in the broader economy precludes finding empirical evidence of their expected positive marginal influence on population growth.

In summary, in the rural sample we observe that own CCS membership and membership in surrounding CCSs in "other "co-ops category are, at the 1% level of confidence, positive population growth factors. Consumer co-op membership from the surrounding areas is also highly related to own CCS population growth, which might be an indication of the spillover effects of co-ops activity from surrounding areas. Although our results by co-op type continue to show little or negative relationship with population growth in worker and producer co-ops, there was some evidence that *different co-op types may have different effect.* The relationship between population growth and co-op activity may vary by type and by sensitivity to organizational

Table 5.5a: Rural 91-01 % Δ in Population Regression Results by Co-op Type [a,b]

	RURAL			
Variables[c]	**CONSUMER (1)**	**PRODUCER (2)**	**WORKER (3)**	**OTHERS (4)**
Dist_cma_100k	-0.0002	-0.0002	-0.0002	-0.00021
	(-4.04)***	(-4.12)***	(-4.00)***	(-4.26)***
Incre_dist_250k	-0.00007	-0.00008	-0.00008	-0.00008
	(-1.69)*	(-1.75)*	(-1.66)	(-1.74)*
Incre_dist_500k	-0.00024	-0.00023	-0.00022	-0.00024
	(-2.78)***	(-2.72)***	(-2.62)**	(-2.75)***
Nearest/own_cmapop_91	5.50E-07	5.21E-07	5.10E-07	1.67E-08
	(2.19)**	(2.17)**	(2.16)**	(2.22)**
Pop_surr	2.28E-07	2.80E-07	2.79E-07	2.73-07
	(3.97)***	(3.90)***	(3.88)***	(3.72)***
Own_ccspop_1991	5.50E-07	5.21E-07	5.10E-07	4.93E-07
	(0.51)	(0.48)	(0.47)	(0.46)
Share_aborig	0.15896	0.16306	0.16293	0.15442
	(1.70)*	(1.74)*	(1.75)*	(1.65)
Share_unidegree	0.09669	0.1063	0.10652	0.11331
	(0.51)	(0.56)	(0.56)	(0.6)
Employ_rate	0.25516	0.25416	0.25312	0.25238
	(5.73)***	(5.79)***	(5.73)***	(5.68)***
Share_agric_employ	-0.41493	-0.41323	-0.41603	-0.4156
	(-7.29)***	(-7.59)***	(-7.48)***	(-7.35)***
Share_prim_employ	-0.52613	-0.52891	-0.52726	-0.51641
	(-4.85)***	(-4.92)***	(-4.94)***	(-4.76)***
Share_manu_employ	-0.26937	-0.26778	-0.27016	-0.27593
	(-3.53)***	(-3.53)***	(-3.55)***	(-3.59)***
%nonfarm_self_employ	0.06592	0.06384	0.06162	0.06193
	(0.71)	(0.69)	(0.67)	(0.67)
July_rh	-0.00003	-0.00004	-0.00003	0.00001
	(-0.08)	(-0.13)	(-0.07)	(0.04)
Jan_temp	0.00262	0.00262	0.00258	0.0025
	(2.60)**	(2.52)**	(2.49)**	(2.45)**
Percapita_cinema	334	331	333	213
	(1.98)*	(1.96)*	(1.98)*	(1.37)
Percapita_outpatient	10	9	9	9
	(0.63)	(0.53)	(0.52)	(0.53)
Percapita_cons_member	-0.0107			
	(-1.04)			
Percapita_cons_mem_surr	0.03908	n/a	n/a	n/a
	(1.75)*			
Percapita_prod_member	n/a	-0.01099	n/a	n/
		(-0.73)		
Percapita_prod_mem_surr	n/a	-0.00376	n/a	n/a
		(-0.05)		
Percapita_worker_mem	n/a	n/a	0.02953	n/a
			(0.47)	
Percapita_worker_mem_su	n/a	n/a	-0.84543	n/a
			(-2.54)**	
Percapita_other_member	n/a	n/a	n/a	4.95775

				(3.44)***
Percapita_other_mem_sur	n/a	n/a	n/a	1.48998
				(4.19)***
Prov_dummy[e]	Yes	Yes	Yes	Yes
R-squared	0.3159	0.3148	0.3157	0.3185
Observations	1994	1994	1994	1994

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. * , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d] n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e]Yes denote that provincial dummies are included in the model. Constant term included in the model but not shown.

changes or turbulence in market conditions. Further, some co-op sectors may have different priorities than others. The following section gives a summary of the regression results we obtained when the data was arranged by industry type.

5.2.4 Regression Results by Industry Type

Each co-op type (consumer, producer, worker and 'other') includes a number of different industry categories. For example, consumer co-ops have all the industry categories represented. The distribution of industries varies by co-op type as shown in Table 5.4. Our data is organized into co-ops by industry category in order to capture various membership structures and their objectives. The first group, agriculture co-ops (290), is a combination of agriculture supply and marketing co-ops, whose mandate is to enable farmers to receive a fair price for their products. In addition, agriculture co-operatives formed so their farmer members had more control over their marketing and input supply. Thus 225 of the 290 agriculture co-ops are producer co-ops. Our second group is retail co-ops, which are almost exclusively consumer co-ops - 393 of the 414 retail co-ops.

The largest industry sector in our sample (1,649) is composed of the housing co-ops. Due to the large numbers and their importance in the Canadian economy, especially in Quebec and

Table 5.5b: Urban 91-01 % Δ in Population Regression Results by Co-op Type [a,b]

	URBAN			
Variables[c]	**CONSUMER (1)**	**PRODUCER (2)**	**WORKER (3)**	**OTHERS (4)**
Constant	-0.192	-0.203	-0.198	-0.202
	(-2.49)**	(-2.62)**	(-2.53)**	(-2.57)**
Dist_cma_100k	-0.00025	-0.00029	-0.00028	-0.00028
	(-3.68)***	(-4.32)***	(-4.37)***	(-4.37)***
Incre_dist_250k	-0.00011	-0.0001	-0.00011	-0.0001
	(-2.57)**	(-2.21)**	(-2.23)**	(-2.23)**
Incre_dist_500k	0.0001	0.00009	0.00008	0.00009
	(0.6)	(0.56)	(0.46)	(0.57)
Nearest/own_cmapop_91	1.51E-08	1.482E-08	1.486E-08	1.503E-08
	(2.34)**	(2.29)**	(2.30)**	(2.30)**
Pop_surr_91	-9.22E-09	-8.13E-09	-7.94E-09	-8.558E-09
	(-0.76)	(-0.74)	(-0.76)	(-0.75)
Own_ccspop_1991	-7.96E-08	-7.03E-08	-7.94E-09	-7.538E-09
	(-1.46)	(-1.52)	(-1.53)	(-1.52)
Share_aborig	0.29532	0.32172	0.32199	0.32309
	(1.83)*	(2.03)**	(2.03)**	(2.04)**
Share_unidegree	-0.06925	-0.08084	-0.06912	-0.0671
	(-0.45)	(-0.52)	(-0.44)	(-0.42)
Employ_rate	0.34133	0.34626	0.34145	0.34218
	(3.96)***	(3.99)***	(3.87)***	(3.82)***
Share_agric_employ	-0.46018	-0.4462	-0.43519	-0.43127
	(-2.29)**	(-2.18)**	(-2.16)**	(-2.15)**
Share_prim_employ	0.19423	0.20121	0.19619	0.2097
	(0.75)	(0.77)	(0.76)	(0.81)
Share_manu_employ	0.06488	0.10473	0.12038	0.11051
	(0.28)	(0.46)	(0.53)	(0.48)
%nonfarm_self_employ	0.5188	0.52273	0.50475	0.51854
	(2.11)**	(2.14)**	(2.07)**	(2.14)**
July_rh	0.00094	0.00095	0.0009	0.00093
	(2.00)**	(2.04)**	(1.92)*	(2.01)**
Jan_temp	-0.00182	-0.0022	-0.00214	-0.0021
	(-1.64)	(-2.09)**	(-2.00)**	(-1.98)*
Percapita_cinema	30	28	43	41
	(0.77)	(0.79)	(1.08)	(1.05)
Percapita_outpatient	-167	-138	-150	-149
	(-0.98)	(-0.78)	(-0.87)	(-0.87)
Percapita_cons_member	-0.09677	n/a[d]	n/a	n/a
	(-2.95)***			
Percapita_cons_mem_surr	-0.46498	n/a	n/a	n/a
	(-0.68)			
Percapita_prod_member	n/a	-0.22469	n/a	n/a
		(-3.90)***		
Percapita_prod_mem_surr	n/a	0.13598	n/a	n/a
		(0.82)		
Percapita_worker_mem			-5.08822	
	n/a	n/a	(-1.27)	n/a

Percapita_worker_mem_su			-0.20686	
			(-0.12)	
Percapita_other_member	n/a	n/a	n/a	0.0204
				(0.19)
Percapita_other_mem_sur	n/a	n/a	n/a	-0.01287
				(-0.25)
Prov_dummy[e]	Yes	Yes	Yes	Yes
Observations	510	510	510	510
R-squared	0.4834	0.4813	0.4787	0.4777

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions . * , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d] n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e]Yes denote that provincial dummies are included in the model. Constant term included in the model but not shown.

Ontario, we separated these from the rest of the service industry category. Housing co-ops have developed to meet the needs of average income households who could not afford housing on the private market. Dependence on government financing, differentiates housing co-ops from other co-operatives. In the "Other services" category (1,280 co-ops) we encompass all co-ops that respond to the service-type economic and social needs of their members. Service co-ops are operational in various sectors from child care, transportation, and health care to utility provision.

Similar to the analysis by co-op type described above, the analysis included the entire set of rural and urban communities, and successively included as potential explanatory variables membership in agriculture, retail, housing and "Other services". Tables 5.6a and b outline the results for industry categories. Agglomeration, economic and built amenity factors are very robust factors in the industry type regressions, being very similar to the base model. There were slight fluctuations in the R-squared values for both the rural and urban sample. With regards the co-op variables, some variations appear. From columns 1, 2, 4 of Table 5.6a and column 1 of Table 5.6b membership in agriculture, retail and in the other services category are inversely

related to population growth. Yet the retail services have a significant and positive impact in the urban areas.

With regard to membership in housing co-ops, we find that own CCS housing membership is positive but not significant in either the rural and urban regressions. However, housing co-op membership in surrounding rural CCSs was positive and significant. This may reflect the fact that the presence of housing co-ops which can spillover to neighboring CCSs may help reduce costs, thus becoming an important factor for rural population growth. We expected a positive response in the urban CCS since housing co-ops are more concentrated in large urban centers where the high private housing market prices are a disincentive to average income households. Quarter (1992) indicates the lack of financial independence differentiates housing co-ops from other co-ops. They require mortgage subsidies from the government to enable average residents to afford the co-op houses. Thus government support is also required.

In summary, our results show that housing co-operatives in surrounding rural communities and retail and 'Other service' co-ops in urban centers, contribute to population growth in their communities. These findings lend further support to the second hypothesis that we proposed in our study.

Table 5.6a: Rural 91-01 % Δ in Population Regression Results by Co-op Industry Type [a,b]

RURAL				
Variables[c]	**Agriculture (1)**	**Retail (2)**	**Housing (3)**	**Other Services (4)**
Constant	-0.019	-0.02245	-0.02221	-0.02326
	(-0.31)	(-0.37)	(-0.37)	(-0.38)
Dist_cma_100k	-0.0002	-0.0002	-0.0002	-0.0002
	(-4.07)***	(-4.07)***	(-4.07)***	(-4.14)***
Incre_250k	-0.00008	-0.00008	-0.00008	-0.00008
	(-1.72)*	(-1.73)*	(-1.77)*	(-1.76)*
Incre_500k	-0.00023	-0.00023	-0.00022	-0.00024
	(-2.70)***	(-2.73)***	(-2.63)**	(-2.81)***
Nearest/Own_cmapop_91	1.64E-08	1.65E-08	1.69E-08	1.64E-08
	(2.16)**	(2.18)**	(2.25)**	(2.17)**
Pop_surr	2.74E-07	2.85E-07	3.36E-07	2.79E-07
	(3.79)***	(3.99)***	(4.90)***	(3.91)***
Own_ccspop_1991	5.31E-07	5.10E-07	3.77E-07	5.46E-07
	(0.49)	(0.47)	(0.35)	(0.5)
Share_aborig	0.16083	0.16163	0.16086	0.1634
	(1.72)*	(1.73)*	(1.73)*	(1.75)*
Share_unidegree	0.10107	0.10209	0.10482	0.1049
	(0.53)	(0.54)	(0.55)	(0.55)
Employ_rate	0.25289	0.25442	0.25431	0.2552
	(5.73)***	(5.75)***	(5.81)***	(5.81)***
Share_agric_employ	-0.40688	-0.41209	-0.41156	-0.41608
	(-7.43)***	(-7.27)***	(-7.42)***	(-7.50)***
Share_prim_employ	-0.53482	-0.52819	-0.53652	-0.52101
	(-4.98)***	(-4.91)***	(-5.03)***	(-4.83)***
Share_manu_employ	-0.26486	-0.26866	-0.26447	-0.26682
	(-3.47)***	(-3.51)***	(-3.55)***	(-3.54)***
Share_non_farm	0.06525	0.06288	0.05837	0.06441
	(0.71)	(0.68)	(0.63)	(0.7)
July_rh	-0.00006	-0.00003	-0.00005	-0.00004
	(-0.16)	(-0.09)	(-0.15)	(-0.12)
Jan_temp	0.00261	0.00263	0.00266	0.00259
	(2.51)**	(2.55)**	(2.50)**	(2.48)**
Percapita_cinema	324.48	333.15	321.41	323.93
	(1.89)*	(1.99)**	(1.92)*	(1.94)*
Percapita_outpatient	9.10372	9.85937	9.63863	8.73594
	(0.54)	(0.58)	(0.57)	(0.52)
Per_agric_member	-0.02257	n/a	n/a	n/a
	(-1.44)			
Per_agric_memsurr	-0.08438	n/a	n//a	n/a
	(-1.15)			
Per_retail_mem	n/a	-0.00058	n/a	n/a
		(-0.06)		
Per_retail_mem_surr	n/a	-0.0239	n/a	n/a
		(-0.98)		
Per_hous_member	n/a	n/a	0.56084	n/a
			(0.99)	

Per_hous_mem_surr	n/a	n/a	5.13087 (2.54)**	n/a
Per_Others_member	n/a	n/a	n/a	-0.03578 (-1.3)
Otherser_mem_surr	n/a	n/a	n/a	-0.05437 (-1.47)
Prov_dummy	Yes	Yes	Yes	Yes
Observations	1994	1994	1994	1994
R-squared	0.3156	0.3151	0.3175	0.3153

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. * , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence d. [d]n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e]Yes denotes that provincial dummies are included in the model. Constant term included in the model but not shown.

Table 5.6b: Urban 91-01 %Δ in Population Regression Results by Co-op Industry Type [a,b]

URBAN				
Variables[c]	**Agriculture (1)**	**Retail (2)**	**Housing (3)**	**Other Services (4)**
Constant	-0.20418	-0.19368	-0.18788	-0.20186
	(-2.63)**	(-2.53)**	(-2.34)**	(-2.63)**
Dist_cma_100k	-0.00029	-0.00025	-0.0003	-0.00029
	(-4.14)***	(-3.83)***	(-4.66)***	(-4.48)***
Incre_250k	-0.0001	-0.00012	-0.00011	-0.00011
	(-2.25)**	(-2.82)***	(-2.29)**	(-2.44)**
Incre_500k	0.00009	0.00009	0.0001	0.00009
	(0.57)	(0.58)	(0.59)	(0.54)
Nearest/Own_cmapop_91	1.49E-08	1.51E-08	1.45E-08	1.55E-08
	(2.31)**	(2.38)**	(2.24)**	(2.39)**
Pop_surr	-8.19E-09	-7.38E-09	-3.00E-09	-8.75E-09
	(-0.750	(-0.72)	(-0.23)	(-0.79)
Own_ccspop_1991	-7.38E-08	-7.14E-08	-7.61E-08	-7.58E-08
	(-1.51)	(-1.48)	(-1.49)	(-1.53)
Share_aborig	0.32412	0.28889	0.33112	0.34538
	(2.03)**	(1.88)*	(2.15)**	(2.17)**
Share_unidegree	-0.08098	-0.0738	-0.07018	-0.06993
	(-0.53)	(-0.48)	(-0.44)	(-0.44)
Employ_rate	0.3464	0.34224	0.34617	0.33869
	(3.98)***	(3.99)***	(3.85)***	(3.87)***
Share_agric_employ	-0.45078	-0.46061	-0.44349	-0.43769
	(-2.20)**	(-2.28)**	(-2.23)**	(-2.18)**
Share_prim_employ	0.20774	0.18259	0.20429	0.15481
	(0.8)	(0.72)	(0.8)	(0.61)
Share_manu_employ	0.09923	0.08479	0.09173	0.1184
	(0.44)	(0.38)	(0.39)	(0.52)
Share_non_farm	0.53163	0.53427	0.49614	0.55522
	(2.17)**	(2.23)**	(2.00)**	(2.27)**
July_rh	0.00094	0.00095	0.00086	0.00093
	(2.00)**	(2.08)**	(1.75)*	(2.00)**
Jan_temp	-0.00219	-0.00171	-0.0021	-0.00211
	(-2.03)**	(-1.52)	(-1.96)*	(-2.00)**
Percapita_cinema	22.83	29.07	39.14	42.19
	(0.62)	(0.75)	(1.03)	(1.05)
Percapita_outpatient	-141.27	-168.67	-140.05	-152.26
	(-0.81)	(-1.01)	-0.81	-0.87
Per_agric_member	-0.12851			
	(-1.14)	n/a[d]	n/a	n/a
Per_agric_memsurr	0.19626			
	(1.09)	n/a	n/a	n/a
Per_retail_mem		0.11691		
	n/a	(2.93)***	n/a	n/a
Per_retail_mem_surr		-0.07502		
	n/a	(-1.15)	n/a	n/a
Per_hous_member		n/a	0.15542	

			(0.18)	
Per_hous_mem_surr	n/a	n/a	2.75418	n/a
			(1.1)	
Per_Others_member				-0.12506
	n/a	n/a	n/a	(-1. 87)*
Otherser_mem_surr				0.13745
			n/a	(2.01)**
Prov_dummy[e]	Yes	Yes	Yes	Yes
Observations	510	510	510	510
R-squared	0.4796	0.4857	0.4792	0.4814

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions.* , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d]n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e]Yes denotes that provincial dummies are included in the model. Constant term included in the model but not shown.

5.2.5 Sensitivity Runs

Our first sensitivity analysis entails re-estimating the base model to test whether various lag structures would be useful in explaining population growth, and more specifically, whether the effect of co-op activity may change. Further, even though 1991 predetermined values for the explanatory variables are used, some endogeneity concerns may remain. Introducing longer lags further reduces the potential concerns of simultaneity or reverse causality between the population growth and the explanatory variables including co-op activity.

First we add 1981-1991 change in population (**%Δ91-81pop)** as an explanatory variable, to assess whether past population growth adds to the explanatory power of the 1991 determinants of population growth. To the extent that communities are experiencing a long term population decline trend, the lagged dependent variable should capture this effect, leaving other explanatory variables, including co-op activity to pick up their own marginal contribution. For example, if co-ops tend to be predominant in declining communities, the lagged dependent variable would capture the long term trend relationship accounting for persistent population decline. Column 2 of Table 5.7a for rural communities shows the results of this estimation. The change in

population between 1981-1991 variable is positive but insignificant. Generally there is a slight modification to the coefficient and t-statistics of most variables, but the direction and significance of influence remain largely unaltered. The coefficient of the co-op membership variable remains negative but is insignificant. We thus infer that the persistent lack of significance of the co-op membership variable is not due to co-op activity being associated with communities experiencing long term population decline.

The only exception is the loss of significance of the share of aboriginal populations. The lagged dependent variable has apparently captured the influence of this variable. Previously observed, in this model there is still no indication of a positive relationship between co-op activity and population growth. The corresponding urban model, column 2 of Table 5.7b shows that the 1981-1991 change in population is inversely related to subsequent population growth a decade later. The direction of influence of all explanatory variables remains unaltered. As in the rural sample, the addition of the lagged dependent variable to reflect long-term trends does not alter the effect of co-op membership. In addition, we also computed a correlation matrix between the 1981-1991 percentage population change in population with various co-operative variables and as outlined by Appendix Table 4 there is no clear or significant relationship.

Column 3 of Tables 5.7 a and b presents the results of another sensitivity analysis, to assess if lagging the socio-economic variables by 10 years might affect the results. In this regression the 1991 to 2001 population change in the base model is expressed as a function of 1981 economic variables, while as represented in equation 14 other explanatory variables remains unchanged, for instance using lagged education attainment variables such as **SHARE_UNI_DEGREE_81**. Following Glaeser et al. (1995), such deep lags, especially the share of individuals with a completed high school education, influence later growth, not in

savings but through influencing the growth of technology. Overall, we use this specification to examine if such deep lags have any impacts on subsequent population changes compared to the originally proposed 1991data.

$$\%\Delta P_{2001-1991} = f(Agglom_{1991}, Econ_{1981}, Amen_{1991}, SoC_{1992}, e) \quad (14)$$

The results from column 3 of Table 5.7a are not very different from the base model (column 1) except for a slight loss in overall explanatory power (R-squared) by about 3 percent points. A trend worth mentioning, however, is there is an increase in significance of many factors, especially agglomeration factors. We attribute this to the fact that the impact of these variables on population growth may take a long time to be fully realized. As was the case for the impact of population size of the nearest urban areas, 1981 CMA population is also a strong determinant of population, signifying the long term importance of access to urban areas for rural growth. Column 3 of Table 5.7b reports on the urban results. It is evident that the economic conditions in the 1980s, such as the employment rate, do not explain the 1991-2001 population growth. In urban areas adjustments to economic conditions may occur more quickly than rural areas.

Column 4 of Tables 5.7a and b presents the result of the 1996-2001 change in population using 1991 explanatory variables, another way of altering the lag structure for the rural and urban sample, respectively. In the rural sample most variable grouping results are similar to the base model results of column 1. However, the population of the nearest CMA and the share of people employed in the manufacturing sector lost significance in the 1996-2001 models. In the urban model (column 3 of Table 5.7b) the clearest result is that the economic conditions appear to have a weaker impact on 1996-2001 population change as compared to 1991-2001. Most variables were less significant or took the opposite sign compared with the base model. For instance, the

share of people reporting an Aboriginal ancestry is now insignificant though it retained its influence for both the rural and urban samples, yet in the base model results this variable was a strong factor in explaining population change. The share of people who have obtained a university degree came out as the only exception under the economic variable groupings. It is apparent that a highly skilled labor force in 1991 is a strong factor in population growth dynamics between 1996 and 2001. Population grew by 0.26 percentage points for every one percentage increase in the share of individual who attained a university degree.

In terms of the sensitivity of the co-operative activity variables, the results show a slight change from the base model. Own CCS and surrounding co-op membership per capita were positive but insignificant in the urban 1996-2001 population change model. However, as before our empirical results do not show clear evidence of a positive link between co-op activity and community population growth.

Table 5.7a: All Co-ops , Rural 81-91, 91-01 and 96-01 % Δ in Population Sensitivity Runs[a,b]

RURAL				
Variables[c]	**91-01 % Δ POP[e]**	81-91 % Δ POP	91-01 %Δ pop 81 Econ	96-01 % Δ POP
	(1)	(2)	(3)	(4)
Constant	**-0.02004**	0.0047	0.0224	-0.0378
	(-0.33)	(-0.08)	(-0.36)	(-1.08)
Dist_cma_100k	**-0.0002**	-0.0002	-0.0002	-0.0001
	(-4.01)***	(-3.87)***	(-3.81)***	(-4.18)***
Incre_dist_250k	**-0.00007**	-7.40E-05	-8.70E-05	-2.20E-05
	(-1.66)*	(-1.69)*	(-1.99)**	(-0.65)
Incre_dist_500k	**-0.00023**	-0.0002	-0.0003	-0.0002
	(-2.85)***	(-2.72)***	(-3.18)***	(-2.83)***
Nearest/own_cmapop_81	**n/a[d]**	n/a	2.35E-08	n/a
			(2.45)**	
Nearest/own_cmapop_91	**1.64E-08**	1.62E-08	n/a	2.87E-09
	(2.18)**	(2.20)**		(0.93)
Pop_surr	**2.80E-07**	2.82E-07	4.16E-07	1.03E-07
	(3.93)***	(3.98)***	(4.25)***	(2.48)**
CCSpop_1981	**n/a**	n/a	1.08E-07	n/a
			(-0.09)	
CCSpop_1991	**5.44E-07**	7.04-07	n/a	4.92E-07
	(0.51)	(0.63)		(0.66)
%Δ91_81pop	**n/a**	0.0565	n/a	n/a
		(1.14)		
Share_aborig	**0.15736**	0.1447	0.226	0.1116
	(1.68)*	(1.53)	(1.95)*	(1.72)*
Share_unidegree	**0.09429**	0.0923	0.3324	0.0287
	(0.5)	(0.49)	(1.24)	(0.26)
Employ_rate	**0.25442**	0.2037	0.1714	0.1052
	(5.70)***	(3.49)***	(2.79)***	(3.26)***
Share_agric_employ	**-0.41137**	-0.3735	-0.3286	-0.1482
	(-7.32)***	(-5.34)***	(-5.00)***	(-3.37)***
Share_prim_employ	**-0.52944**	-0.5183	-0.6457	-0.2642
	(-4.89)***	(-4.57)***	(-6.77)***	(-3.07)***
Share_manu_employ	**-0.26696**	-0.2484	-0.2728	-0.0605
	(-3.50)***	(-3.16)***	(-3.51)***	(-0.97)
%nonfarm_self_employ	**0.06685**	0.0647	0.024	0.0394
	(0.73)	(0.71)	(0.25)	(0.72)
July_rh	**-0.00003**	-0.0001	0.0002	-0.0002
	(-0.09)	(-0.15)	(-0.54)	(-0.6)

Jan_temp	**0.00262**	0.0026	0.0024	0.0012
	(2.61)**	(2.53)**	(2.28)**	(1.86)*
Percapita_cinema	**334**	351	391	92
	(1.95)*	(2.12)**	(2.25)**	(0.83)
Percapita_outpatient	**10**	13	-6	9
	(0.63)	(0.79)	(-0.32)	(0.48)
Percapita_member	**-0.00879**	-0.0077	-0.0086	-0.0041
	(-1.02)	(-0.88)	(-1.03)	(-0.77)
Percapita_mem_surr	**-0.03992**	-0.0373	-0.063	-0.0086
	(-2.04)**	(-1.91)*	(-2.78)***	(-0.52)
Prov_dummy[f]	**Yes**	Yes	Yes	Yes
Observations	**1995**	1995	1999	1990
R-squared	**0.3163**	0.3178	0.2934	0.1841

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. * , ** and *** denote significance at 10%, 5% and 1% respectively. [c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d]n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas.[e]denote that we inserted the base model results of Table 5.2 a in column 1 for ease of reference. [f] Yes denotes that provincial dummies are included in the model. Constant term included in the model but not shown.

Table 5.7b: All Co-ops, Urban 81-91, 91-01 and 96-01 %Δ in Population Sensitivity Runs[a,b]

	URBAN			
Variables[c]	**91-01 % Δ POP[e] (1)**	81-91 % Δ POP (2)	91-01 %Δ pop 81 Econ (3)	96-01 % Δ POP (4)
Constant	**-0.20068**	-0.2425	0.167	-0.1141
	(-2.56)**	(-3.58)***	(1.54)	(-2.62)**
Dist_cma_100k	**-0.00029**	-0.0003	-0.0004	-0.0001
	(-4.32)***	(-4.40)***	(-4.16)***	(-2.56)**
Incre_dist_250k	**-0.00011**	-0.0001	-0.0002	-0.0001
	(-2.29)**	(-2.40)**	(-2.77)***	(-1.63)
Incre_dist_500k	**0.00009**	0.0001	-0.0001	8.64E-05
	(0.58)	(0.48)	(-0.7)	(1.4)
Nearest/own_cmapop_81	**n/a[d]**	n/a	2.25E-08	n/a
			(2.33)**	
Nearest/own_cmapop_91	**1.52E-08**	1.37E-08	n/a	4.89E-09
	(2.35)**	(2.28)**		(1.16)
Pop_surr	**-9.46E-09**	-4.51E-09	-1.93E-08	1.23E-06
	(-0.84)	(-0.4)	(-1.28)	(1.47)
CCSpop_1981	**n/a**	n/a	-8.02E-08	n/a
			(-0.79)	
CCSpop_1991	**-8.02E-08**	6.832E-08	n/a	5.32E-03
	(-1.61)	(1.61)		(0.51)
%Δ91_81pop	**n/a**	-0.0812	n/a	n/a
		(-1.92)*		
Share_aborig	**0.32286**	0.3663	0.2133	-0.0189
	(2.05)**	(2.21)**	(1.55)	(-0.26)
Share_unidegree	**-0.07118**	-0.0631	0.0878	0.2623
	(-0.46)	(-0.43)	(0.4)	(3.12)***
Employ_rate	**0.3441**	0.4152	0.0792	0.0405
	(3.93)***	(6.72)***	(0.56)	(1.12)
Share_agric_employ	**-0.4468**	-0.4235	-0.2373	-0.0199
	(-2.21)**	(-2.46)**	(-1.6)	(-0.25)
Share_prim_employ	**0.21609**	0.1825	-0.2749	0.0995
	(-0.83)	(0.75)	(-1.37)	(0.76)
Share_manu_employ	**0.09266**	0.1104	-0.4924	0.0538
	(0.4)	(0.5)	(-2.08)**	(0.54)
%nonfarm_self_employ	**0.5148**	0.468	0.0837	-0.0324
	(2.11)**	(1.98)*	(0.4)	(-0.32)
July_rh	**0.00093**	0.0011	0.0002	0.0012
	(1.98)*	(2.23)**	(0.33)	(3.21)***

Jan_temp	**-0.0021**	-0.0018	-0.0008	-0.0014
	(-1.97)*	(-1.66)	(-0.53)	(-1.5)
Percapita_cinema	**35**	36	-4	13
	(0.9)	(0.97)	(-0.12)	(0.89)
Percapita_outpatient	**-134**	-143	-120	-44
	(-0.76)	(-0.82)	(-0.67)	(-0.61)
Percapita_member	**-0.01513**	-0.0189	-0.0547	5.67E-04
	(-0.48)	(-0.61)	(-1.76)*	(1.05)
Percapita_mem_surr	**0.03688**	0.0424	0.015	0.0028
	(0.92)	(1.04)	(0.25)	(0.09)
Prov_dummy[e]	**Yes**	Yes	Yes	Yes
Observations	**510**	510	510	510
R-squared	**0.4786**	0.488	0.2085	0.3454

[a]Note the Territories are excluded from the sample. The share of non-farm employment is measured for the working age workforce 25-54 years old; all the other employment variables are expressed as a percentage of the population 15 years and above. [b]Robust t statistics in parentheses. They are adjusted for regional clustering of the error terms by Census Divisions. * , ** and *** denote significance at 10%, 5% and 1% respectively.[c]See Appendix Table 2 for variable definitions, and Table 1 for a summary of expected direction of influence. [d]n/a denote that variable did not apply to the given model e.g. rural CCSs in Quebec do not have cinemas. [e] Note that we inserted the base model results of Table 5.2 a in column 1 for ease of reference. [f]Yes denote that provincial dummies are included in the model. Constant included in the model but not shown.

5.3 Summary

This research investigated the impact of co-operatives in their local communities as well as spillover effects from co-ops in surrounding areas. Table 5.8 summarizes the results of our investigation of the relationship between co-op membership and community population growth for all of the analyses conducted—that is, all co-ops, co-ops by region, and co-ops by type and cop-ops by industry. Where there was a positive (negative) statistically significant relationship, the sign of the relationship is indicated. Where the relationship, regardless of sign, was statistically insignificant, only n.s. (not significant) is indicated. Occurrences of a positive significant relationship are highlighted.

In the presence of the prevailing socio-economic and spatial attributes of the communities, we found that at the national level, there is no evidence to clearly point to co-operative membership, as indicators of social capital, influencing population growth. However,

there is some variation in the results when we investigate the relationship at the regional level, and for different co-op types/industries. For example we find evidence that co-op activity in some regions such as British Columbia and Quebec show positive outcomes from co-operative activity in terms of population growth.

With respect to the relationship between co-operative membership and population growth at national level, it appears that the processes that generate co-op activity (co-op membership) are not closely related to those that produce population growth. Alternatively there may be a number of offsetting influences (positive effects in some regions, negative in others), or omitted variables that are confounding the results.

Table 5.8. Summary of the Impact of 1992 Per Capita Co-op Memberships in Own and Surrounding Communities, on 1991-2001 Rural and Urban Population Change.

Co-operatives Categories	Rural Population Change	Urban Population Change
All Co-ops		
Community, all co-ops	n.s.	n.s.
Surr.Community, all co-ops	-ve	n.s.
Co-ops by Region		
Community, Prairies, all co-ops	n.s.	n.s.
Surrounding Communities, Prairies, all co-ops	-ve	n.s.
Community, BC, all co-ops	n.s.	n.s.
Surrounding Communities, BC, all co-ops	+ve	n.s.
Community, Atlantic prov., all co-ops	-ve	n.s.
Surrounding Communities Atlantic, all co-ops	-ve	n.s.
Community, Que., all co-ops	-ve	+ve
Surrounding Communities, Que., all co-ops	n.s.	n.s
Community, Ont., all co-ops	n.s.	-ve
Surrounding Communities, Ont., all co-ops	n.s.	n.s.
Co-ops by Co-op Type		
Community, Consumer Co-ops	n.s.	-ve
Surrounding Communities, Consumer Co-ops	+ve	n.s.
Community, Producer Co-ops	n.s.	-ve
Surrounding Communities, Producer Co-ops	n.s.	n.s.
Community, Worker Co-ops	n.s.	n.s.
Surrounding Communities, Worker Co-ops	-ve	n.s.
Co-ops by Industry Category		
Community, Agriculture Co-ops	n.s.	n.s.
Surrounding Communities, Agric. Co-ops	n.s.	n.s.
Community, Retail Co-ops	n.s.	+ve
Surrounding Communities, Retail Co-ops	n.s.	n.s.
Community, Housing Co-ops	n.s.	n.s.
Surrounding Communities, Housing Co-ops	+ve	n.s.
Community, Other Services Co-ops	n.s.	-ve
Surrounding Communities, Oth. Serv. Co-ops	n.s	+ve

Source: Authors' estimates.

CHAPTER 6: SUMMARY AND CONCLUSIONS

6.0 Introduction

The purpose of this research was to examine the impact of co-operatives on community population growth and retention. Co-operatives are considered to be an indicator of social capital. Community commitments trust and networks that are characteristic of social capital are also thought to underlie the development of co-operatives. A model of population change was used to determine, in addition to underlying socio-economic and geographic attributes of an area, the marginal role that co-operative membership may play. This chapter will give a synopsis of our research findings and the respective policy implications. Thereafter, conclusions will be drawn, followed by a discussion of the research limitations. We conclude by highlighting areas of further research.

6.1 Summary of Research Findings

Our research has highlighted the importance of access to agglomeration economies for community population growth. For instance, there is a distance penalty (in terms of community population growth) associated with being locating farther away from the core of the urban centers. For the rural areas CCSs, we find strong evidence in support of the spillover benefits from being located near an urban centre. Further, the population size of the nearest urban centre is also found to be an important determinant of rural community population growth. This shows the importance of access to urban agglomerations and strong rural-urban linkages. Economic development policies may be used to facilitate such synergies.

Our results also suggest that the percentage of the population that is of aboriginal population origin strongly and positively impacts pop growth, with implications speaking to the need for stronger public policies and resources to engage this growing population. The share of

population, who attained a university degree, as our proxy for human capital, shows no clear results. We expected education to reflect qualifications and expertise and thus productivity which would in turn support population and economic growth. The absence of strong findings to support this hypothesis likely means that the impact of human capital is already captured in the distance and population size variables. Alternatively, increased levels of education will make a labor force more mobile and more costly. In the absence of local opportunities it is possible that higher education leads to out-migration.

As expected the employment rate variable came out strongly positive and significant, whilst a high share of employment in the primary industries resulted in population decline. Thus, in light of the trends facing the agriculture and the primary sectors at large, communities dependent on these sectors would benefit from engaging in diversification of their economic bases. The share of population employed in the manufacturing sector exerts a negative effect, counter to expectations. However, if the manufacturing in rural communities is predominantly routine manufacturing this sector has also been subject to labor saving technologies. Declining labor requirements may account for the negative impact. Lastly our economic variables showed that in urban CCSs, the share of population engaged in non farm self employment, our indication of entrepreneurship, is a very important determinant of population growth. Consistent with our theoretical model, most of our socio-economic and spatial variables show evidences that households "vote with their feet" to communities with favorable economic conditions.

In undertaking our analysis our major focus was to investigate if, in addition to the above discussed socio-economic and spatial variables, the presence of co-operative activity has an impact on population growth. Our hypotheses therefore were:

- *Communities with a higher level of co-op activity (potentially contributing to social capital) grow faster than those with lower levels;*
- *Various co-op types may have different effects on communities*

At the national level, our empirical results do not show clear evidence of a positive link between co-operative activity and population growth. A number of measures of co-operative activity were utilized. Per capita membership in the surrounding CCSs, per capita total co-operative assets, co-op employment and wages as well as the count of co-ops within 100km and 200km of a given CCS centroid were all employed as measures of co-operative activity. Non of these variables were robust to enable us to accept the first hypothesis.

Other innovative analysis, such as a regional co-op regression analysis, analysis by co-op type and industry category has shown that some types of co-op have different influences on the community than others. For instance housing co-op membership in surrounding communities in the rural samples is positively and significantly related to population growth. We also find a positive similar relationship in rural CCSs in BC and urban CCSs in Quebec. This suggests possible differences in the way co-operatives influence their local communities across regions of Canada as well as differences by type of co-op. These findings supported the second hypothesis that we proposed in our study. Overall, however, no general pattern of a positive relationship between co-op activity and community population growth was found.

6.2 Implications for the Co-operatives Sector

The co-operatives sector has gained widespread recognition in Canadian society since their inception in the 19th century, and various researchers have documented their influence in sectors as agriculture (Fowke, 1973), their resilience in small communities (Fulton and Ketilson, 1992) to how they contribute to sustainable development (Quarter, 1992; Gertler, 2001). In most

of these studies co-ops are viewed as possible means to address the many questions facing our society. After controlling for other factors, including demographics, economic and geography, our study conducted an empirical analysis of the influence of co-ops on 1991-2001 population growth in rural and urban communities in Canada.

In light of our findings, there are a number of considerations in the interpretation of these results in the context of our initial hypotheses:

- The presence of some results showing a positive relationship between community population growth and co-op membership by region, by type and by industry category suggests the national-level investigation for all co-ops may be too broad.
- There may be other influences that cannot be captured in the econometric analysis. If there are unknown omitted variables that are strongly correlated with co-ops, this could generate the present results.
- While we have used co-op membership as an indication of social capital, the results do not necessarily negate the positive influence of social capital on community attractiveness. There may be other aspects of social capital that are not represented by co-ops and aspects of co-operatives that do not perfectly coincide with social capital characteristics.
- Imperfections in the data representing co-op activity and membership at the community level may account for limited positive findings.
- Co-operatives undoubtedly perform numerous valued functions for their membership that may not translate into community population growth. The limited positive findings here should not be taken as a negative assessment of co-ops in their communities.

Most importantly, the research results reported here provide fertile ground for additional investigations. While a small set of questions may have been answered, many more have been raised:

- What factors could improve the social capital function of co-operatives?
- What are the mechanisms by which co-operatives make communities more attractive places to live and do business?
- How can co-ops more directly impact economic development?
- What incentives would reinvigorate member commitment and the active role of members in their communities?
- How can co-ops keep abreast of the demands and challenges of globalization, economic restructuring and member needs?

Fundamentally, the role of social economy enterprises in community growth and vitality requires further investigation. In addition to case studies and theoretical work, quantitative analyses such as that presented here have an important function. Through rigorous econometric investigation the relevant questions and hypotheses can be articulated and refined. A more complete understanding of the role of social economy enterprises, of social capital and of co-ops in the community will improve both our academic understanding of these relationships as well as contributing to the policy environment. From the perspective of the co-operatives themselves, research results may be useful in increasing their effectiveness and assessing their priorities. Just as co-operatives were able to develop and thrive amidst the turmoil of the 19th century, an improved understanding of their role in the modern economy will enhance their ability to play a positive role in their communities in the 21st century.

6.3 Limitations of the Study

Although this study is one of the first to empirically investigate the impact of co-operatives, through their social capital attributes, on population growth it has a number of limitations. As our major explanatory variable of interest, co-op activity has been taken as an indication of the presence of social capital in our communities. Social capital has a number of meanings and terms that researchers from across disciplines have proposed as the best representation of what social capital represents. As a result this makes the identification of a proper indicator for social capital difficult (Durlauf and Fafchamps, 2004; Rupasingha et al., 2006). Apart from that there are limitations to what social capital can do. Social capital alone cannot build the social economy and develop communities (Woolcock, 2000), rather it has to be used in conjunction with other forms of capital—financial, human, environmental and cultural. Finding the right combinations and conducive settings may be key to achieving the required synergies.

In terms of the choice of variables, our co-ops variables were highly correlated with one another and only the conceptually "best" measure (per capita membership) was included. None of the other measures performed better in the model. For the set of socio-economic variables included, they are fairly complete in terms of our conceptual model. Yet it is possible that some unknown omitted variables influenced the outcome.

Another limitation in our study emanated from our data. We used data from the yearly survey of co-ops collected by the Co-operatives Secretariat and have a 75 percent response rate. This might underestimate the presence of co-op in communities which are reported as having no co-ops due to missing variables. Apart from that we had some co-ops removed from the data set as they had numbers reporting both at headquarters level as well as at community level.

Another limitation to our study is how we interpret the lack (presence) of evidence to support the importance of co-ops in population growth. For instance it is possible that some communities will be observed to be growing or declining in population regardless of the presence of co-ops. In these communities co-ops may simply be a substitute for private businesses rather than a net addition. If we take for example that some co-op retail services are more expensive that the regular retailers, we might explain the underlying logic through the Coase theorem (Datta, 2004)[12]. The literature suggests that negotiation processes for membership rights over the organization and the need for mechanisms to keep the co-op activities in check usually result in unwarranted increases in transaction costs (Fulton and Ketilson, 1992). If it were the case that co-ops *increase* rather than *decrease* transaction costs they could lead to higher costs of production than the efficient solution. This could be a negative influence on community population growth.

6.4 Areas of Further Study

Our research focused on the impact co-operative activity, as an indication of social capital, on population growth. Whilst this study offered the empirical analysis that has been missing in most co-operative impact studies, it generated a number of questions that will need further exploration. For instance, from our results we conclude that there might be differences in the processes that perpetuate co-op growth versus those that result in population growth. Whilst there are lots of studies on population growth determinations, a research focusing on co-operative membership growth processes would be very informative. Future work that also explores alternative empirical analysis in co-operative impact would also be useful. For instance, the inclusion of the social capital aspect of co-operatives along with human and financial capital

[12] Datta (2004) used the coarse theorem to find answers as to why co-ops in India operate inefficiently, or why they typically face capital shortages.

in the regression analysis maybe informative. As elaborated earlier, social capital on its own has some limitations. In another dimension, perhaps a more detailed examination, at the micro level, of co-op activities designed to support population growth and retention might also provide additional explanation for the relationship between community growth and retention and co-operative activity.

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Appendix Table 1: Consolidated Census Subdivisions (CCS) Descriptive Statistics[a,b]

	Full Sample		Rural		Urban	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev
Dependent Variable						
91-01_POP_CHANGE	0.014	0.173	-0.009	0.170	0.108	0.149
96-01_POP_CHANGE	-0.013	0.104	-0.024	0.108	0.032	0.073
Agglomeration						
DIST_CMA_100K	127.695	115.855	139.466	114.366	80.018	109.544
INCRE_DIST_250K	97.974	149.082	104.070	153.075	73.286	128.893
INCRE_DIST_500K	49.884	130.063	49.790	130.168	50.264	129.762
%Δ81_91POP	0.037	0.225	-0.001	0.186	0.186	0.295
NEAREST/OWN_CMAPOP_91	651,669	972,356	581,372	886,499	936,410	1,222,055
NEAREST/OWN_CMAPOP_81	567,338	825,509	505,821	760,093	816,512	1,012,904
POP_SURR_91	65,993	202,331	27,394	45,333	222,338	410,127
POP_SURR_81	59,120	184,395	25,460	38,974	195,457	377,634
OWN_CCSPOP_91	10,704	53,120	2,770	3,770	41,723	112,297
OWN_CCSPOP_81	9,233	48,538	2,591	3,535	36,137	104,702
Economic						
SHARE_ABORIG_91	0.042	0.101	0.044	0.110	0.035	0.054
SHARE_ABORIG_81	0.025	0.098	0.027	0.104	0.019	0.071
SHARE_UNIDEGREE_91	0.059	0.053	0.046	0.036	0.108	0.076
SHARE_UNIDEGREE_81	0.037	0.031	0.030	0.026	0.060	0.036
EMPLOY_RATE_91	0.601	0.200	0.559	0.162	0.764	0.247
EMPLOY_RATE_81	0.519	0.107	0.503	0.107	0.583	0.077
SHARE_AGRIC_EMP_91	0.089	0.111	0.103	0.118	0.032	0.046
SHARE_AGRIC_EMP_81	0.089	0.109	0.103	0.116	0.031	0.043
SHARE_PRIM_EMP_91	0.018	0.033	0.019	0.034	0.014	0.030
SHARE_PRIM_EMP_81	0.022	0.040	0.024	0.041	0.016	0.036
SHARE_MAN_EMP_91	0.043	0.047	0.043	0.050	0.043	0.031
SHARE_MAN_EMP_81	0.051	0.052	0.052	0.055	0.047	0.034
%NONFARM_EMP_91	0.075	0.047	0.073	0.051	0.083	0.029
%NONFARM_EMP_81	0.065	0.046	0.063	0.049	0.071	0.030
Amenities						
JULY_RH	58.505	9.319	58.522	9.346	58.439	9.217
JAN_TEMP	-11.857	4.376	-11.924	4.397	-11.584	4.283
PERCAPITA_CINEMA	4.31E-06	3.42E-05	1.69E-06	1.45E-05	1.45E-05	4.45E-05
PERCAPITA_OUTPATIENT	3.56E-05	1.84E-04	4.25E-05	2.06E-04	8.75E-06	5.75E-06
Social Capital						
PERCAPITA_MEMBER	0.100	0.274	0.109	0.294	0.063	0.172
PERCAPITA_MEM_SURR	0.126	0.191	0.138	0.202	0.077	0.130
PERCAPITA_CONS_MEMBER	0.063	0.201	0.068	0.213	0.047	0.140

PERCAPITA_CONS_MEM_SURR	0.090	0.150	0.096	0.156	0.065	0.119
PERCAPITA_WORKER_MEMBER	0.001	0.017	0.002	0.019	0.000	0.001
PERCAPITA_WORKER_MEM_SURR	0.001	0.005	0.001	0.006	0.000	0.002
PERCAPITA_PROD_MEMBER	0.019	0.101	0.022	0.111	0.007	0.039
PERCAPITA_PROD_MEM_SURR	0.016	0.043	0.019	0.046	0.007	0.025
PERCAPITA_OTHER_MEMBER	7.62E-05	1.55E-03	5.41E-05	1.49E-03	1.63E-04	1.75E-03
PERCAPITA_OTHER_MEM_SURR	0.001	0.020	3.75E-04	0.005	0.004	0.043
PERCAPITA_AGRIC_MEMBER	0.023	0.112	0.027	0.123	0.008	0.041
PERCAPITA_AGRIC_MEM_SURR	0.019	0.049	0.022	0.053	0.007	0.025
PERCAPITA_RETAIL_MEMBER	0.045	0.175	0.047	0.185	0.038	0.128
PERCAPITA_RETAIL_MEM_SURR	0.072	0.134	0.078	0.141	0.048	0.099
PERCAPITA_HOUSE_MEMBER	0.001	0.004	4.09E-04	0.003	0.002	0.005
PERCAPITA_HOUS_MEM_SURR	0.001	0.002	0.001	0.002	0.002	0.003
PERCAPITA_OTHERSE_MEMBER	0.014	0.077	0.016	0.084	0.007	0.039
PERCAPITA_OTHERSE_MEM_SURR	0.016	0.051	0.016	0.048	0.015	0.060
N	**2,601**		**2,086**		**2,086**	

a.See Appendix Table 2 for variable Definitions. Due to data limitations the Territories are excluded from the sample

b.Note that descriptive statistics from sensitivity analysis models are also included.

Appendix Table 2: Description of Variables used and Data Sources

Dependent Variable	Description	Source
91-01_POP_CHANGE	Percentage Change in the total population between 1991 and 2001	91 and 01 CoP
96-01_POP_CHANGE	Percentage Change in the total population between 1996 and 2001	96 and 01 CoP Author[a]
Agglomeration		
DIST_CMA_100K	Distance from centroid of nearest or own CCS[b] to CMA with a population of 100,000+	CRERL[c], IDLS
INCRE_DIST_250K[e]	Incremental Distance from centroid of CMA with a population of 100,000+ to a CMA with a population of 250,000+. Computed from the difference between INCRE_DIST_250K and DIST_CMA_100K	CRERL, IDLS[d]
INCRE_DIST_500K	Incremental Distance from centroid of CMA with a population of 250,000+ to a CMA with a population of 500,000+	CRERL, IDLS
%Δ_81-91_POP	Percentage Change in the total population between 1981 and 1991	81 and 91 CoP
NEAREST/OWN_CMAPOP	Population of the nearest/own Census Metropolitan area	81 and 91 CoP, Author
POP_SURR_91	Sum of 1991 Population from surrounding CCSs	81 and 91 CoP, CRERL
OWN_CCSPOP_91	Own Census Consolidated Subdivision non-institutional Population	81 and 91 CoP,
Economic		
SHARE_ABORIG_POP	Percentage of total non-institutional population reporting an Aboriginal Identity	81 and 91 CoP, Author
SHARE_UNIDEGREE	Percentage of population over 15 years of age, with a University Degree	81 and 91 CoP, Author
EMPLOY_RATE	Individuals 15+ employed divided by total population 15+	81 and 91 Co P, Author
SHARE_AGRIC_EMPLOY	All individuals 15 years and over employed in the Agriculture Sector divided by total population 15+	81 and 91 CoP, Author
SHARE_PRIM_EMPLOY	All individuals 15years and over employed in the Primary Sector divided by total population 15+	81 and 91 CoP, Author

SHARE_MAN_EMPLOY	All individuals 15years and over employed in the Manufacturing Sector divided by pop 15+	81 and 91 CoP, Author
%NOMFARM_SELF_EMPLOY	Individuals 25-54 whose major job is self employment (non-farm) divided by total population between ages 25 and 54	81 and 91 CoP, Author
Amenities		
JULY_RH	20 year average July Relative Humidity data (%)	Environ Canada, CRERL
JAN_TEMP	20 year average January mid temperatures (degrees Celsius)	Environ Canada,CRERL
PERCAPITA_CINEMA	Density of cinemas in the CCS per 1,000 population	DMTI, CRERL, 91 CoP, Author
PER_OUTPATIENT_CLINIC	Density of out patient clinics in the CCS per 1,000 population	DMTI, CRERL, 91 CoP, Author
Social Capital		
PERCAPITA_MEMBER	Own CCS Co-operative membership divided by own CCs population	Secretariat CRERL, 91 CoP, Author
PERCAPITA_MEM_SURR	Co-operative membership from surrounding CCS divided by total population from surrounding CCS	Co-op Secretariat CRERL,91 CoP, Author

[a]Author -denote data that was modified by the authors , CoP-Census f Population; [b]CCS stands for Census Consolidated Sub division, which is our unit of observation, see footnote 6 for description ;[c]CRERL-Canada Rural Economy Research Lab (www.crerl.usask.ca) examines all issues that affect the vitality of Rural Canada from a diversified economy, healthcare, environment, amenities, transportation, to a productive and sustainable agricultural sector. ILDS – Internet Data Library System provided data that was used in the conversion of spatial data; [d]The variable INCRE_DIST was obtained by subtracting the distance to the nearest mega center from the distance to the nearest urban center; [e]Data to proxy for social capital was generated from the 1992 Co-operatives Secretariat yearly co-operative mail survey.

Appendix Table 3: Co-operative Classification and Total Counts in each Sector[a]

Sector	Activity Code	Description	# in Sample	%
	11	Direct Charge	21	0.58
	12	Grocery Store	169	4.65
	13	Specialty Food Store	12	0.33
	15	Library : Supplies, bookstore	61	1.68
	18	Gas Station	25	0.69
Retail	20	Other Consumers	126	3.47
	130	Agri Supply	100	2.75
	140	Feed Mill	35	0.96
	150	Farm petroleum	60	1.65
Agriculture Supply	180	Other Supply	5	0.14
	260	Dairy	16	0.44
	271	Fruit	27	0.74
	272	Vegetables	8	0.22
	273	Greenhouse Vegetables	4	0.11
	280	Grains and Oilseeds	7	0.19
	290	Livestock	16	0.44
	300	Poultry and Eggs	4	0.11
	310	Honey and Maple	5	0.14
Agriculture Marketing	320	Other marketing	3	0.08
Marine Resources	490	Fish	35	0.96
	500	Animal reproduction	4	0.11
	510	Grazing	103	2.84
	530	Feed Finance	63	1.73
	540	Farm petroleum	3	0.08
	560	Machinery	6	0.17
Production/Manufacturing: Agriculture	565	Other Agricultural production	3	0.08
	571	Clothing	2	0.06
	572	Construction	2	0.06
	573	Handicraft	27	0.74
Production/Manufacturing:Manufacuring:	579	Other Production/Manufacturing	7	0.19
Production/Manufacturing: Agriculture	581	Tree farming	5	0.14
	582	Reforestation	4	0.11
	583	Forest Works	39	1.07
	584	Saw mill	1	0.03
Production/Manufacturing: Natural	585	Wood Processing	8	0.22
Resources:	589	Other Natural Resources		0.00
	711	Rural Electric	3	0.08
	712	Natural gas	60	1.65

	713	Water	41	1.13
	714	Volunteer fire Department	14	0.39
	715	Recycling		0.00
Service: Utilities	719	Other Utility	4	0.11
	721	Daycare	35	0.96
Service: Child Care	722	Preschool	262	7.21
	730	Seed Cleaning	76	2.09
	733	Farmer Market	12	0.33
	735	Soil Conservation	2	0.06
Service: Agriculture	739	Other Agricultural Services	17	0.47
	741	Health Clinic	4	0.11
	742	Ambulance	5	0.14
	745	Home Care	3	0.08
Service: Health Care	749	Other Health	4	0.11
	751	Taxi	20	0.55
	752	Bus	7	0.19
	753	Freight	10	0.28
	754	Courier	1	0.03
Service: Transportation	759	Other Transportation	1	0.03
	770	Funeral	38	1.05
	800	Recreation	159	4.38
Service: Other Service	810	Restaurant and Hotel	17	0.47
	830	**Housing**	**1606**	**44.21**
	831	Equity housing	1	0.03
Service: Housing	839	Other Housing	42	1.16
	841	Editing and publishing	3	0.08
	842	Radio, Television, phone	30	0.83
Service: Communication	849	Other communication	5	0.14
	861	Economic development	56	1.54
	862	Business Services	9	0.25
	863	Family Budget	20	0.55
Service: Development	869	other development	12	0.33
	870	Informatics		0.00
	880	Domestic and Janitorial services	1	0.03
	910	Fine arts and Culture	11	0.30
	930	Financial services	5	0.14
Service: Other Service	990	Other Services	21	0.58
Total		**TOTAL**	**3633**	100

Housing Co-ops were analyzed separately from the Service Industry co-ops, as they make the bulk of the data. The rest of the co-ops in the services industry were placed under OTHERSERVICES

Appendix Table 4: Correlation Matrices: Co-op Variables vs. 81-91 % Change in Population

RURAL	81-91 Change in pop	Percap members	Percap Memb surr	Percap Co-op 100km	Percap Co-op 200km	Percap Co-op Assets	Percap Co-op Employ	Percap Cons Member
81-91_pop_change	1							
per_members	-0.1428	1						
Per_mem_surr	-0.2886	0.2781	1					
pert_coop_100km	-0.314	0.223	0.4494	1				
per_coop_200km	-0.3552	0.2143	0.46	0.6033	1			
per_coop_assets	-0.0795	0.3933	0.0657	0.0795	0.0683	1		
per_coop_employ	-0.1859	0.1231	0.5302	0.2897	0.2679	0.0145	1	
perita_consumer_members	-0.0402	0.1174	-0.0085	0.012	0.0047	0.8116	-0.0107	1

URBAN	81-91 Change in pop	Percap members	Percap Memb surr	Percap Co-op 100km	Percap Co-op 200km	Percap Co-op Assets	Percap Co-op Employ	Percap Cons Member
81-91_pop_change	1							
percapita_members	-0.1168	1						
percapita_mem_sur	-0.0436	0.1747	1					
percapit_coop_100km	-0.0846	0.2346	0.3791	1				
percapita_coop_200km	-0.1172	0.3631	0.4069	0.74	1			
percapita_coop_assets	-0.0309	0.0437	-0.0028	0.007	0.0086	1		
percapita_coop_employ	-0.0239	0.1511	0.2777	0.0957	0.176	-0.0186	1	
percapita_consumer_memb	-0.0301	0.0392	-0.0103	0.0033	0.0043	0.9989	-0.0159	1